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[OFFICIAL NOTICE.]

New England Association of Gas Engineers.

BOSTON, MASS., January 8th, 1883.

The Annual Meeting of the Association will be held at Young's Hotel, Boston, Mass., on the 21st and 22d days of February next, commencing at 11 o'clock, A.M., on Wednesday, the 21st of said month.

Members intending to propose the names of applicants for membership, are requested to send them to the Secretary at least two days before the time of meeting.

The Board of Directors will meet in Room 11, on the evening of February 20, at 8 o'clock. Papers to be read before the Association should be forwarded to the Secretary in time to be presented to the Directors, at this meeting, for approval.

Managers, superintendents and engineers of gas companies, are cordially invited to the meeting. Those wishing rooms engaged, will please notify the Secretary on or before February 17th

JOHN ANDREW, H. A. ALLYN, GEO. B. NEAL, *Committee of Arrangments.*

GEO. B. NEAL, *Secretary.*

TO OUR PATRONS.

We wish to call the special attention of our subscribers and readers to the department established in the last Number of the JOURNAL, and continued in the present issue, under the heading of "Items of Interest from Various Localities." It is our intention to make this a permanent feature of the JOURNAL; and our desire is that it shall contain such items of interest to the fraternity as may occur during the interim of our publication. With this end in view we invite our friends all over the country to mail to us any and every item which may seem to them to be worthy of notice. The local papers generally give close attention to what is going on in their districts, and are pretty sure to give an account of matters of a purely local concern; this is the kind of matter which we desire to obtain, and which will be the most easily reached by our subscribers. Whenever the sender of such items can find it convenient to enclose a line giving his views regarding the news sent, his opinions will receive careful attention. By such co-operation as this we feel fully assured that our "Item" columns cannot fail to be made both valuable and interesting.

Should any of our advertisers deem it worth their while to send us an account of any contracts which they have made, or any statement as to the description or magnitude of the work which they are performing, we will make a note of the same.

ANNUAL MEETING OF THE NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

The Thirteenth Annual Meeting of this Society takes place in Boston, on the 21st and 22d days of February, according to the official notice published in this issue. It is to be sincerely hoped that this meeting will prove a little more prolific in the matter of prepared papers than some of the previous ones. The New England meetings are always interesting; but the permanent value of an association is greatly enhanced by the bringing out of regularly prepared papers. Where all are such good fellows there is a natural tendency to make the "good time" rather paramount to the good *work*. The president's address will be looked forward to with much interest, as Mr. Slater is plain and practical, and speaks generally to the point; and we feel quite sure that, under his leadership, we shall have a record that will speak for itself and need no apology.

Every arrangement has been made, as usual, to promote the comfort of those who attend; and it is to be hoped that every member will be in his place, and be prepared to do his proper share of the work.

GAS FINANCE.

The objects for which the British Association of Gas Managers (now the Gas Institute) was formed in the year 1863, are thus set forth in its Constitution: "For the advancement of gas engineering, manufacture and finance, and to facilitate the exchange of information among its members." As to

the first two objects and the last there is little difference in the object of this important Association and that of others formed since then in this country; but as to the third item, gas finance, it is a subject which has played a very insignificant part in the transactions of any of our societies. This is a matter to be regretted most exceedingly, for there is no doubt but that, if a strong united effort had been made by the members of our various associations to put this department upon a proper basis, success would have attended the effort, and most companies would have been saved many of the trials, tribulations and troubles wkich have beset their managements, and sometimes even threatened their very existence.

By gas finance we mean such a policy as regards the selling department of the business as shall be uniformly clear, and based on a fair business footing, by which it would be perfectly easy for any one to understand exactly what the value of any gas property should be. Before this matter was taken in hand in England, there was very much the same condition of things as exists here to-day, viz., every company being generally managed on a basis of its own which, in the opinion of its president and board of directors, was supposed to bring in the most money in the shortest space of time. High prices, unusual dividends, sometimes haughty and inconsiderate treatment of customers, all paved the way for the natural uprising of rivals, and opposition companies became so numerous that London was lighted, or distracted, by more than a dozen companies, so that in some streets there were to be found the pipes of half a dozen corporations. Competition only served to raise the price of gas eventually to the consumer, as interest had to be paid on the additional unnecessary capital put into the business—an evil which has entailed its ill consequences even unto the present day, when gas is sold in London for 75 cents per thousand. In all this there was no fixed principle followed, no harmony of action, nothing which could be called a sound financial policy, and nothing which tended to make an investment in gas securities either permanent or desirable. Extravagance, rather than proper economy, characterized management and construction. The result of all this, in a country where the investor expects to be protected in his rights of property, and where the public claim some relief from oppression, was that legislation must be invoked and an effort made to bring the chaotic mass of evil practice on a sound financial basis, suited to the business, which should alike protect the investor and the public. The folly of setting two or more men to do what one could do better alone was but too clearly demonstrated. The greater folly of employing two or more sets of capital, officials, etc., etc., to transact a business where only one capital and one organization was necessary, was so flagrant a violation of the principles of political, as well as financial, economy that regulation by law became inevitable.

Of course, the first efforts at such legislation were principally characterized by hostility to the vested interests involved. Fortunately some of those at at the head of affairs of some of the gas companies were far-sighted men, and disposed to mature plans for bettering the condition of affairs. Amalgamation, as far at the time as was possible, was the first thing undertaken and successfully carried out. The old Chartered company amalgamated, in time, with several of the other companies, under the title of The Gas Light and Coke company. The engineers and managers of the several companies were given places in the board of the new company; and thus men who were thoroughly familiar with the details of manufacture, as well as the wants of the community were brought to the councils of the new organization in positions where their influence was felt. Beckton was conceived and executed; to-day its daily make equals 30 millions cu. ft., and London, on the north side of the Thames, is supplied by two companies, and on the south side by two more—and of these latter, one is now being merged into the Gas Light and Coke company, so as to leave the south side of the river to be supplied exclusively by the South Metropolitan company.

During all these changes, which have taken years to accomplish, various acts of legislation were passed which have established the financial policy of the companies, as well as regulated the quality and illuminating power of the gas. The latter regulations are very stringent; and besides this it was proposed to fix the rate of dividend and the selling price of gas. No capital can be raised without showing that the amount is absolutely necessary for the business, and the shares issued must be sold at public auction, and the premiums, if any, passed to capital account, though not subject to dividend. This is what is known as the "Auction Clause" of the law.

When the question of fixing price and dividend was being agitated, Mr. George Livesey boldly came forward and advocated what is known as the "sliding scale." Many managers disagreed with him at the time as to the soundness of this policy; but events have proved that he was right. With all the energy of his nature, he spoke as a stockholder, as a secretary, and as engineer of one of the largest companies, and also as a consumer. The honesty and integrity of his purpose were unanswerable. He claimed that if price was fixed and dividend was fixed, there would be no inducement for companies to do anything more than to get their dividend and keep the price of gas where it was—all incentive to economy and improvement in manufacture would be lost. He therefore proposed to assume a certain initial price at which gas might be sold, and the company allowed to pay 10 per cent. dividends if they could make them honestly from their profits; but for every reduction in price to the consumer the company should be allowed a certain proportional increase in their dividend, provided they could make it. For instance, suppose the price of gas to be reduced by the company 4d. below the initial price fixed by law; then the company should have the right to pay an additional one per cent. dividend.

This was finally adopted, and is now the policy which is fixed upon all companies applying for additional capital, so far as that new capital is concerned. The working of this system has been a great success—so much so that, with the various amalgamations that have been going on, the growth of the city and consequent extension of business, as well as the increase arising from new uses to which gas has been applied, added to the improvements in manufacture, some of the companies now pay 13 per cent. on portions of their stock, while the price of gas to the consumer has been correspondingly reduced.

Thus we see that from all the trials and troubles that beset the London companies, there has come a distinct and fixed system of gas finance, which is understood by all, and which makes the investor in gas shares as secure as it is possible to make him. Nothing shows this more clearly than the following article from a London paper—

"The upward movement in gas stocks since the commencement of the new year has been so marked as to suggest the reflection, What is the influence at work that is drawing so many of the investing public eagerly back to their old loves, which not long ago were languishing in the cold shade of disfavor? The solution of it no doubt is that, after having been sadly alarmed, people are coming to their senses, and the electric scare is dead. A desperate attempt was made a week or two ago to galvanize a kick out of the lifeless thing, by means of one of those marvellous stories from the other side of the Atlantic which had so often proved successful bogeys to frighten timid folks with; but the charm was gone, and it would not work. The fairy-tale fell flat as a pantomime; and indeed it might have served seasonably as 'Harlequin Prince Edison; or, the Disenchanted Lamp.' What are the latest incidents in electric circles? The Dublin Electric Light Company, which was to crush and pulverize our old friend the Alliance and Dublin Consumers' Gas Company, resolved, in general meeting, on the 4th inst., to wind up voluntarily. The Devon and Cornwall Electric Company (one of the innumerable Brush progeny), against whom a shareholder was moving for a winding-up order, resolved last Wednesday to surrender at discretion, and to become a consenting party to its own 'happy despatch.' The Board of the Anglo-American Company (the prolific dam of all the Brush brood) announced on Friday that 'having regard to the large stocks on hand, and the present temporary depression of electric lighting business, they will be adopting the most prudent course in abstaining from declaring any further dividend for 1882.' Commendable prudence indeed!—or is it only another exemplification of the axiom, *Ex nihilo nihil fit?* To conclude the week, the Managing Director of the Maxim-Weston Company addressed on Saturday, in the colnmns of the *Money Market Review*, a pathetic appeal to his proprietary, bespeaking their considerate indulgence towards the small success of his endeavors to do business, seeing the 'public disfavor into which electric enterprise had fallen.' Need we look further afield for reasons why Gas should be firm?"

When we bear in mind that capital to the amount of about $60,000,000 has been put into electric companies in Great Britain, and see that, in spite of its influence, the financial policy of the gas interest is such as to command respect and confidence, it must be admitted that those men who addressed themselves to the problem of gas finance, and worked it out so succesfully, were well worthy of the places they held, and the confidence reposed in them; and, more than all this, that a fixed policy in gas finance is the best possible means to render the value of the undertakings permanent and desirable.

There is a lesson to be drawn from all this, that is not difficult to be seen, we trust. There are individual companies in this country that have conducted their business for years upon a basis of finance which has at once rendered them almost popular with the community, and made their positions impregnable to outside encroachments.

We believe the day is not far distant when legislation of some kind or other will be adopted in many of our States, with the object of securing cheaper gas to the consumer, and, at the same time, limiting the dividends of the companies. Sooner or later this is bound to come in some form or other. How is the movement to be met? We say unhesitatingly that the true interests of all concerned, consumer and investor alike, demand that such action should be led and directed by the best talent in the gas business. None know better than they the history of the long conflict which we have hastily sketched above; none know better than they the difference between the possible and the impossible—the sensible and the absurd. It is useless to say they will not be heard, for the magnitude of the business and the capital involved, its constantly increasing proportions, and its importance to the

community, are bound to make themselves felt if only honestly and properly presented. There must, however, be a concert of action; spasmodic individual effort is of no avail. In every State there should be an organization of all the companies, not for purposes of technical discussion of manufacture, but for the purpose of establishing a system of gas finance that should subsequently be secured by the proper legislative action. The old-fashioned policy of grab-all and keep-all must come to an end. Reasonable men will have no difficulty in developing a scheme that shall equitably adjust the rights and the relations of all parties, and maintain them. Conference between the organizations of the different States would be easily established, and an interchange of results would follow.

The gas interest should most certainly have a voice in legislation affecting itself; and if it can present a more reasonable scheme than any one else there will be no difficulty in securing its adoption. There is no use in approaching the problem in any one-sided or partial manner, for it is self-evident that the surest means for success is to be able to show that all interests are equitably adjusted. Until this is done there will ever be more or less uncertainty about the safety of gas property; but when it is done there is no reason why such property should not become the safest and most desirable manufacturing property to be found anywhere.

GAS ENTERPRISES.

While individuals interested in the Standard Oil Company may be also interested in gas manufacture, it does not follow from this that the Standard Company, as such, is engaged in promoting gas enterprises. An organization for developing gas processes, with a nominal capital of, say, one million of dollars, may have half a dozen stockholders who may also hold Standard stock; but it by no means follows that the whole Standard stock is backing the gas process. Far from it. The only liability of the Standard man is for the amount of stock he has actually subscribed for in the gas process organization; and probably his only interest is to get what he can out of it. If it succeeds, his other enterprise is benefited, if the process is an oil process. If it does not succeed, he pockets his loss and does his best to put up the price of oil and get his money back.

Mr. Edison on Storage Batteries.

There appears to be one point at least on which our "own Edison" and those engaged in the manufacture, storage and distribution of gas have thoroughly agreed upon. This unanimity of opinion centers upon the idea that the so-called storage batteries, whereby electricity is to be delivered to consumers, already bottled up and ready for use—somewhat after the fashion, at present in vogue around New York city, of furnishing "bottled milk"—is a delusion and a snare, when commercially considered.

A representative of the Boston *Sunday Herald* called upon Mr. Edison, some time ago, with the object of ascertaining his views upon the electric light in general; and the outcome of the interview furnishes some very interesting reading. Mr. Edison, in considering the subject of "storage," made use of some plain language, and we reproduce some of his remarks, regretting that lack of space prevents us from giving the interview in full. In answer to the question as to what he thought of the utility and value of storage batteries, Mr. Edison said—

"The storage battery is, in my opinion, a catch-penny, a sensation, a mechanism for swindling by stocking companies. The storage battery is one of those peculiar things which appeal to the imagination, and no more perfect thing could be desired by stock-swindlers than that very self-same thing. In 1879 I took up that question, and devised a system of placing storage batteries in houses connected to mains, and charging them in the day time, to be discharged in the evening and night, to run incandescent lamps. I had the thing patented in 1879 (I forget the date of the patent) but there is nothing in it. I rung all the changes on it. My plates were prepared like Plante's. The method of preparing them for charging is more tedious, but it is better than that of Faure, after preparation. You know the first storage battery was sent from France to Sir William Thompson, who was at first astounded by it. He was asked to endorse it, consented and took a retainer; but on investigation he became convinced that there was nothing in it, and returned the retainer to the French company. The fact is, the more he investigated the more he found out the fallacy of the whole business. On account of what Labouchere calls a swindle, this secondary battery has been used by the arc companies in England. One company alone, on the strength of an accumulator and an incandescent lamp copied from mine, by one George Lane Fox, floated subsidiary companies, whose aggregate capital was over thirty millions of dollars, and immense sums were paid by these companies to the parent company for rights. Within the last few months the bubble has burst, the shares, upon which $25 have been paid, are offered at $1, and the swindling companies have been sued for making misrepresentations in their prospectuses as to the value of the accumulator and the right in the incandescent lamp of Mr. Fox, it appearing, from the proceedings before Mr. Justice Chitty, that another company had a right to the lamp, and this company acknowledged that it was a piracy of the Edison lamp, and were paying royalty to the Edison company for the right to use. The action before Justice Chitty was brought by a stockholder in a subsidiary company to cause the return of his subscription on the above account. The judgment was in his favor. This was the great Brush electric light bubble, in which millions were lost, and caused the now celebrated article of Labouchere. One of the leading spirits in the bubble is in this country at the present time attempting to do the same, but Carlyle's saying about thirty millions of fools probably didn't apply to foreign countries,

"Scientifically the thing [storage] is all right, but commercially an absolute failure, as one can imagine. You can store it and hold it; but it is gradually lost, and will all go in time. Its efficiency, after a certain number of charges have been sustained, begins to diminish, and its capacity and efficiency both diminish after a certain time in use, necessitating an increased number of batteries to maintain a constant output. Owing to corrosion of the sustaining plates of the battery, the effect of local action and other causes, too many to enumerate, the yearly depreciation of the battery is not less than 30 per cent. of its first cost, if used daily. The facts are that there are two or three companies that have been organizing subsidiary arc light companies throughout the country for some time past. In this arrangement the parent company made money by selling machinery, etc., to the working companies, but the latter companies are not making money; and have nearly ceased giving new orders. Now the parent companies, finding the call for machinery slacking, have come in with their secondary batteries. They now make this statement which is the cleverest thing I ever heard of. Here, gentlemen, you have a large investment in machinery, etc., for furnishing light, but are not making any money out of it. Now, we have something by which you can utilize your machinery. You can work day and night, and can do more work. You can utilize your present plant in the day-time, and the electricity thus made in the day-time for incandescent lighting, and in the night have your plant for arc lighting direct. That sounds good and fair, does it not? The board of directors discuss the offer and think it a good thing. Then they conclude to go into it. You probably know what the wisdom of the average board of directors amounts to.

"I will tell you where the fallacy in this arrangement lies. It consists in the fact that the cost of batteries to store this extra electricity that could be produced in the day-time would be twice as much as the station that produced it; so that, if the company has already invested $100,000, and agree to utilize their machinery in the day-time, by the addition of storage batteries, they will find that to carry out their desires it will cost them $200,000 for the batteries. I will guarantee that not one board of directors in a hundred will see it, and the parent concern will not tell them of it until after they have purchased. It seems to be natural with boards of directors that if there be a wrong way to do a thing they will surely do it that way. Well, they have purchased the storage batteries, of course, at a cost of $200,000. On that investment, at the end of the first year, they have a depreciation of thirty per cent. To save themselves they will have to earn interest on their investment. They must earn enough to meet the extra depreciation on their plant running through the day, and will have to spend double the amount in coal to obtain the same output from batteries, for the reason that they interpose between the source of energy and the light a thing in which there is a loss both in charging and discharging, and a loss while standing, and that loss increases as the battery gets older, after a certain maximum is reached.

"The maximum of a storage battery is about fifty per cent. You get the maximum of current when you utilize the full capacity of the battery, the same as in a steam engine, where, if steam is admitted for the full stroke, 50 per cent. of the steam or power is wasted, but you obtain the maximum power from the engine; but this is also the minimum of economy. Hence to get the proper economy, engine builders only take one-third to one-fourth of the maximum power from their engines, but this adds to the investment, which is compensated for by the saving in economy, which more than pays interest on increased investment. When they say that 90 per cent. is obtained from the battery they tell you what is scientifically true. They say they get ten lights of 16 candles each per horse power of current. Now, that is true and untrue. If you get a horse power of current from a battery it will give you 10 lights of 16 candles; but to get that you have to net all losses through the battery, through the wires, through the dynamo, and all that. They start off with a horse power indicated in the engine. A certain amount of this is taken to move the engine and dynamo, and a certain amount is lost in the dynamo to convert power into electricity, because no machine is perfect; a certain amount must be lost on the wire connecting the station with the secondary battery; another amount is lost in charging the battery, due to its resistance and imperfection as a mechanism; another amount is lost during the interim between charging and use; another portion will be lost in discharging the battery through the lamps, and still another amount will be lost in the wire connecting the battery to the lamp. So that your horse power will dwindle down until it will give you only about three lamps; whereas, if you worked direct you would probably get six lamps."

The Standard Oil Company.

Attention has often been called by the newspapers of the country to the great and rapid development which has been so marked a feature of the history of the "Standard Oil Company." This great corporation shows very clearly what may be accomplished from small beginnings, and how it is possible that great industries may be concentrated under one management, and made subservient to the ideas and wishes of a comparatively small number of capitalists.

The current number of the *North American Review* contains two articles on the Standard Oil Company, one, from the pen of Senator J. N. Camden, exhibiting the formation and mode of operation of this concern in its most favorable light; the other, contributed by Mr. John C. Welch, deals with the same topics in a less friendly manner.

Keeping in mind the article published in our issue of Feb. 2, on "Rumors of the Day," we think the papers which here follow will prove interesting reading. The concluding sentence of the second paper will be well worth while pondering over.

THE STANDARD OIL COMPANY.

By Senator J. N. Camden.

Few things in fiction are more wonderful than the history of petroleum since the opening of the first oil well in Pennsylvania, on August 28, 1859. Four years before that time Jonathan Watson, who owned a tract of land on Oil Creek, noticed oil flowing from a spring. He took a bottle of it to Hartford, Conn., to have it analyzed by a well-known chemist. This authority pronounced it an artificial product, and not a natural one. Had any person then predicted that Northwestern Pennsylvania and West Virginia would be found to contain vast reservoirs of this oil, and that it would in a score of years have added $1,000,000,000 to the wealth of the nation, he would have been considered insane. Yet such a prediction would have fallen short of the truth. There are to-day more than 20,000 wells producing this oil, and over 100,000 persons are exclusively engaged in handling it. Railroads have been built to transport it, while through a network of over 4,000 miles of iron pipes, running over mountains, beneath rivers, and through cultivated fields, streams of it pulsate continually. Oil from the wells in Pennsylvania lights the streets of South American cities, cathedrals in Europe, the mosques of Asia, the shop windows of Jerusalem, and it is known and used over the whole civilized world.

While Col. E. L. Drake has the credit of being the first person to drill successfully for oil in this country, Mr. Charles Lockhart, of Pittsburgh, Pennsylvania, was probably the first person who made the production of the article a business. The discovery of petroleum in Pennsylvania was followed closely by its development in West Virginia, on the Rathbone estate, at Burning Springs. The first wells bored in West Virginia yielded oil at less depth and in greater quantities than the first wells of Pennsylvania, and, in consequence, West Virginia was supposed to be the richest territory; but the immense yield resulting from deeper boring and the discovery of new territory in Pennsylvania soon left that State without a rival.

In 1860 Mr. Lockhart visited Europe to introduce the crude and refined oils there, and, although his samples attracted little attention at the time, his trip was not without subsequent good results. Beginning in 1862 with shipments of 588,000 gallons of oil to Germany, which was sold for $2,000 less than the cost of transportation across the sea, the exportation of oil has steadily increased, until it now reaches but little less than 2,000,000 gallons a day. For the first seven months of 1882 the value of the exports of petroleum and its products was $30,946,856, which was exceeded only by the exports of cotton and cereals. During the first eight months of 1882, 433,261,181 gallons of crude oil, or its equivalent in refined, were exported, against 390,016,648 gallons during the corresponding period in 1881.

These surprising results are by no means due to the simple discovery, in 1859, that oil could be obtained by drilling for it. Petroleum was no new thing in 1859. It has been known in Europe and Asia since the earliest ages of the world. Kerosene was extracted from the cannel coals of England in 1694, as recorded in the specifications of letters patent granted at that time. It was afterward made from the bog-head shales of Scotland, the albertite of New Brunswick, and the asphaltum of Trinidad. Coal oil was also manufactured from coal in Prince Edward's Island in 1846. A kerosene oil manufactory of this kind was established on Newtown Creek, Long Island, in 1854, several years before the oil discoveries in Pennsylvania. Kerosene, however, was a manufactured article, while petroleum is the natural product of the earth. It is produced in the North of Italy, and was used there for illuminating purposes before attention was called to it in this country in 1859. It is also found in Germany, France, Russia, India, in the Island of Trinidad, and in Canada.

It is plain, therefore, that it is to neither priority of discovery nor monopoly of the world's supply that the overwhelming pre-eminence of American petroleum is due. Quite as much as from the native superiority of the article, this pre-eminence results from our peculiar national genius and capacities in respect to both mechanics and commerce. The following example will serve to illustrate the difference between American and other methods in this industry. In 1735 an oil field was discovered in Alsace. It proved a profitable investment, and oil—used there principally for lubricating purposes—is still obtainable in paying quantities. The striking peculiarity is that the working of this field has been developed to the extent of only four wells in 150 years, while the same crude methods for obtaining it are in use now that were used in the beginning. The only improvement is that within a few years a boiler and engine for hoisting purposes have been substituted for human labor. The Cherry Grove district in Pennsylvania is not larger in extent than the Alsatian field, and yet 350 wells were sunk there within two or three months of 1882. Still more striking comparisons could be made with other and less civilized countries where petroleum has been obtained in greater or less quantities for ages.

It may be admitted, then, that to our national characteristics is to be largely attributed the unprecedented development of the American petroleum industry. The specific agency through which this development has been mainly effected is the organization known as the Standard Oil Company, which may be defined to be an association of business houses united under one management in such a manner as to insure harmony of interests, and a consolidation of capital adequate to any possible business emergency, yet each retaining its individuality, and even competing sharply with the others.

In order to appreciate what the Standard Oil Company has achieved, it is first necessary to glance at the condition of the oil industry at the time when this company entered it. All the circumstances surrounding the first production of petroleum tended to make it an unbusiness-like enterprise. The novelty of the article, the romance of the search for it in the wilderness, the sudden and fabulous wealth that rewarded success—all these attracted especially the unsettled and adventurous elements of the community, and made the oil regions, in 1865, almost the counterpart of California 15 years before. Truth, stranger than fiction, turned men's heads. Sober business was neglected. The main idea was to obtain a fortune by speculation or by a fortunate turn of the drill. Volumes have been written about the vicissitudes of this extraordinary period. Col. Drake, the pioneer, wasted a fortune in speculation, and in his last years was only saved from actual want by a pension which the State of Pennsylvania granted him (and afterward continued to his widow), refuting the old proverb of the ingratitude of republics. Shaw, who discovered oil in Canada, also lost in speculation the money his discovery had brought him, and ten years later, while working for $2 a day in Titusville, died a stranger and forgotten. John Steele, or "Coal-Oil Johnny," as he was familiarly called, the youth who went to bed one night a laborer and awoke next morning a millionaire, squandered his wealth, and is now earning a modest living at $50 a month. The Story Farm, famous for its immense production, was sold for $30,000. It soon proved to be worth a million. In May, 1865, there were two buildings in Pithole, and three months later 15,000 persons found shelter there. Land which a few months before had been sold for an insignificant sum per acre was resold in town lots at the rate of $10,000 for a piece large enough to build a house upon. The Holmden farm, which was bought for $25,000, was sold in three months for $1,600,000. Magnificent hotels and theaters were built, and railroads and pipe lines constructed to the place. A few months later the oil was exhausted and the town deserted. To-day the relics of a few houses stand to mark the spot. In another case one of these wilderness hotels, costing $65,000 to build and fit up, was suddenly stranded by the receding tide, and being sold for taxes, almost before the paint was dry, brought less than $50.

In such a condition of affairs the state of the oil industry was, of course, deplorable, from a business standpoint. The universality of speculation; the utter disregard of the laws of supply and demand, aggravated by the haste of each land owner to multiply his wells and get as large a share as possible of the underlying oil pool which his neighbors were sucking up; the lack of handling facilities, resulting in prodigal waste; the apparent instability of the whole business, which was hourly expected to vanish, and in many instances did vanish as suddenly as it had appeared—all this conspired to make the oil regions a pandemonium of excitement and confusion, and the simple statement of a man's connection with oil was a severe blow to his credit.

The refining of oil at this early period was on a basis but little better than that of its production. Processes were extremely crude, and their product would to-day be unmerchantable for illuminating purposes. Still, the demand for it was great and growing, and refineries multiplied. The competent and the incompetent rushed into the business in shoals, until the refining capacity of the country was more than three times the demand for consumption. Reaction, failures, and demoralization were the inevitable consequences.

The refiners recognized the dangerous and demoralized condition into which the excessive capacity of the refineries had brought them. The world would take only so much refined oil as it needed for immediate consumption,

and no more ; and the manufactured article, unlike the crude, could not be stored for any length of time. Various efforts were made to correct this evil of overproduction, through pools and running arrangements, restricting capacity ; but pools were broken and agreements were ineffectual, until the lowest ebb in the oil business was reached. By this time bankruptcy had overtaken a large portion of the refining interest, and was threatening all.

Such in general was the situation out of which was developed the Standard Oil Company, as a necessity, to arrest the conditions which were driving all connected with the business to bankruptcy and ruin. To limit production was impossible. The extent of the oil field was a matter of conjecture, while the number of persons who would engage in boring wells and prospecting for new territory was without limit. Leaving production, therefore, to take care of itself, the labors of the Standard Company were concentrated upon the refining interest, with the object of stopping the disastrous overproduction of the manufactured products.

Without entering into the details of their progress—how the principal refining interests were first united under the management of the Standard Company, and how others gradually came into co-operation, whilst those less hopeful of the future of the business were bought out for money ; how ineligibly located or poorly equipped refineries were dismantled and others better adapted to their purposes were improved—it is only necessary to state that their success was such as to vindicate the wisdom of their broad plans and to establish the superiority of their business methods. It did more than this. It demonstrated that, under such firm and intelligent control, the oil business had possibilities which the doubting ones and the public generally had not seen, and this demonstration was followed by an antagonism to the company such as all great and successful organizations have to meet. How these possibilities have been developed is indicated by the facts that a day's work of the Standard Company at this time involves, among other things, the handling of more than 60,000 barrels of oil, the putting together of 90 tons of tank iron, and the making of 100,000 tin cans, holding 5 gallons of refined oil each, and 25,000 oak barrels, to hoop which requires 150 tons of iron.

But while a commanding position in refining was thus being won, the Standard managers were equally active in the mechanical and chemical departments of the business. Under their direction the process of refining was improved more rapidly than ever before. Oils grew better, cheaper, and more uniform, and, as the problems of distribution were grasped and solved, the market for these products widened continually. In a word, the phenomenal genius for organization, which all concede to the Standard, produced its natural results throughout the entire business, and from being one of the most irregular and unprofitable of American industries, oil refining and selling became thoroughly systematized ; and in the train of system followed economy and success.

The question of oil transportation and storage early engaged the attention of the Standard corporation. At the outset the methods of carrying oil were as primitive as might be. Imperfect barrels carried on wagons were jolted to and fro over the corduroy roads which connected the wells with the streams, where rafts and flatboats received them for further laborious transportation. With such methods as these, and the universal rage for well boring, it is small wonder that a great proportion of the oil brought to the surface had to soak back into the earth or float off through the water courses of the vicinity. This condition of things, however did not last long. Railroads were built, tank-cars invented, and finally, in 1865, iron pipes began to be laid to bring the oil from the wells. During the ten years following a number of pipe line companies were organized for running and storing the crude liquid. Each company covered certain territory, and producers availed themselves of the pipe-line facilities. Each producer received a certificate of deposit for his oil, redeemable in oil at any time on payment of storage charges. These certificates, which were not negotiable, were influenced somewhat in value by the pecuniary standing of the company, but more particularly by the nature of the territory the pipe-line company covered ; it was like the old State bank currency. Outside of its particular territory a pipe-line certificate was at a discount.

In 1877 the Standard Oil Company consolidated these various organizations under its own control as the United Pipe Lines. The result is that to-day an oil certificate, like a greenback, is as good in one part of the country as in another, and can be negotiated at any of our commercial centers. These certificates are practically the oil of commerce. Under the present system the collection and handling of crude oil is as nearly perfect as it can be made. The company runs a pipe to each well, even to the most unimportant and isolated, without charge to the producer for the accommodation, thus enabling him to dispense with all local storage. It takes oil anywhere, and delivers it at any railroad shipping point in the oil regions which the holder may indicate, and all this without any other than the regular storage charges. Still further: as the pipe-line certificates are uniformly for 1,000 barrels each, the Standard, for the accommodation of producers having smaller lots to dispose of, keeps its own men constantly "at the front," ready to buy any such lots for cash, at the current market price for larger lots ruling at the oil exchanges on that day. This, as will be seen, places the smallest producer on an equality with the largest.

The amount of oil held by the United Pipe Lines is gauged every day, and once each month a sworn statement is sent to a State official, and also publicly posted in the exchanges, giving the quantity and location of all oil on storage, together with certain other particulars. This system precludes all possibility of an overissue of certificates, and warrants their integrity. During the year just passed the United Pipe Lines purchased over half a million barrels to make up shortage from the natural shrinkage of the oil which they held on storage.

It costs $250,000 for the tankage in which to store 1,000,000 barrels of petroleum, or, for land and tanks and incidentals, $300,000. A plot of 100 acres accommodates only 18 tanks, as they have to be detached and trenches dug around them to provide against fire. Cannon are kept at each tankage station to perforate the tanks when on fire, so as to let the oil out into the ditches, that it may burn gradually, and prevent overflow and still greater damage. Most of the fires at the tanks are caused by lightning. Losses of this kind, for the oil only, are assessed pro rata on all the holders of certificates, thus effecting the cheapest and best kind of insurance. Each tank has a capacity of 35,000 barrels, and the loss of this amount would be made good by an assessment of one-tenth of one per cent. on all oil at present stored.

In six years there has been an increase of some 30,000,000 barrels of oil on storage with the United Pipe Lines. To provide for this increase the company constructs an average of one iron tank of the regular capacity every day. The pipe lines are now connected with about 20,000 wells, and, in addition to the 4,000 miles of pipes already referred to, the company have now in operation more than a thousand miles of trunk pipe lines, running from the oil regions to Cleveland, Pittsburgh, Oil City, Buffalo, and New York, and is rapidly completing trunk lines to Philadelphia and Baltimore, of which 200 miles are already laid. The pumping stations along these trunk lines are about 25 miles apart. At each are two or more tanks, one of which is being emptied while another is being filled. A 6-inch pipe is used, which can deliver 16,000 barrels each 24 hours.

These brief statements, however, give only an outline of what the Standard Oil Company has accomplished. It has been the instrument, if not the cause, of almost the whole development of the oil industry—production excepted—during the last decade ; of vastly improving and bringing to uniformity all oil manufactures ; of cheapening these latter to an unprecedented degree, and pushing the introduction of American petroleum to the remotest parts of the earth ; of furnishing employment to a host of men equal in number to the standing army of the United States, and of giving an impulse of prosperity to every locality in which its operations are conducted. It has probably had less trouble with its enormous laboring force than any other corporation of comparable importance in the world.

In view of this state of facts it might reasonably be supposed that the Standard Oil Company would have been entitled in some degree to public commendation for what it has accomplished, and the beneficial results produced—not that it has any claim on the score of philanthropy. It has not. It was organized and is operated to do in the best manner the largest possible amount of business. But the fact that philanthropy is not the mainspring of its corporate action cannot destroy the other fact that great public benefit has resulted from the Standard's work ; greater, unquestionably, than could ever have been brought about by the use of even equal capital and equivalent energy, divided between a score or a hundred disconnected and unfriendly organizations. In place, however, of the approbation which has been referred to, the Standard Oil Company has for some years been the target for unlimited abuse and misrepresentation. The reasons for this lie partly on the surface. No great enterprise was ever carried through without interference with somebody or something. The choicest field cannot always be saved from the advancing railroad ; yet no one, save perhaps the owner of the property, will insist that railroads should not be built. The parallelism does not need elaboration to indicate the origin of much of the opposition to the Standard. But this company is at least the equivalent of a railroad in importance, and if its progress had worked actual hardship to individuals it could not be justly condemned therefor. In point of fact, however, less of such hardships can be charged upon the Standard than upon most corporations. In all its thousands of miles of pipe-laying no right of eminent domain has ever been exercised, but every foot of the right of way has been purchased by agreement with the landowners. So, too, in consolidating its refining interests, there is no instance in which the company did not pay full value for what it received. Amongst the enemies of the Standard were men whose hardships were wholly of their own making. They were the men who, in the infancy of the combination, when all refiners were invited to ally themselves with it, and take Standard stock to the amount of the agreed valuation of their property, were ready enough to sell, but preferred money to stock, and, after getting their price, congratulated themselves on being wiser than "the visionaries," who were risking everything on the practicability of

their undertaking and the continuation of the oil supply. When, however, the hopes of these visionaries were more than realized, the cautious sellers for cash became unhappy, and finally cried out, not, however, against their own mistakes, but against this dangerous monopoly which had wrested their property from them.

There was no lack of unsuccessful oil men, sensational writers, and persons with grievances, to help give utterance to the anti-Standard cry. The bitterest grievances were those of the small refiners, whose real complaint was that the Standard, with its improved processes and immense product, had too greatly cheapened the cost of manufacturing and marketing refined oil. As it would not do, however, for them to complain that the public was getting its oil too low, they, too, raised a clamor against the "monopoly." A class of politicians, adopting what is known among themselves as the "anti-monopoly racket," were anxious to inflame the public mind against all large corporations. The Standard seemed most vulnerable. It could not be denied that it was a corporation, that it was rich, busy, and little given to talk; and as it paid no attention to attacks, its enemies insisted that this was a guilty silence. The public ear was gradually gained by frequent repetitions of uncontradicted calumny, and several respectable journals and magazines lent themselves, in excusable ignorance of the true state of the case, to the dissemination of the same. The Standard came to be referred to and popularly pictured as a giant monopoly, a monster of iniquity, a crusher of the innocent and helpless, a corrupter of railroads, and a stealthy foe to the liberties of the people. The effect of all this was sought to be heightened by a flavor of mystery and terror. The officers of the company were likened to the tyrants of old, and their private offices to the secret chambers of the Inquisition—and the public listened, and felt its hair rise with horror.

Meanwhile the Standard was, as usual, attending strictly to its legitimate business—refining and selling oil—and employing its great resources in the work of increasing storage facilities rapidly enough to save the producers from the loss of their oil; but to its accusers it made no answer. Whether its indifference to public accusations was the best course under the circumstances it would be fruitless to discuss. Perhaps it was, as all calumny eventually dies of itself. And in the oil regions, where the hostile feeling had its birth, it is indeed practically at an end. Many, however, may still be surprised to learn that the Standard Oil Company is not the monster that it has been represented; that it has never had a contract with a railroad company which a fair-minded man could pronounce to be against public policy, good morals, or good business principles; that it has never broken an agreement nor committed an act of treachery; that it is not a speculator nor a manipulator of speculative prices, as has been so often charged; that it is not a monopoly, and never can become one, despite its great preponderance in the trade; in short, that this great bugbear is nothing more nor less than an organization of laborious, painstaking men, who, with great abilities and great opportunities, have made a great success by legitimate means in a legitimate business.

THE STANDARD OIL COMPANY.

By John C. Welch.

"Whence and what art thou, execrable shape?"
—Paradise Lost.

The institution of which we speak (and it is right to speak of it as an institution, for it is very much more than a corporation) has nothing analogous to it in the other institutions of this country; and still less analogous is it to the institutions of any other country. On this account the idea of it is not readily grasped by the average citizen; he does not obtain a particularly intelligent or discriminating view of it; he hears a few things and draws a conclusion, which conclusion may stand with a greater or less degree of permanence, according as his mind may be undisturbed on the subject further, or something of a more forcible character than he has yet heard comes before him, and he makes a new estimate. In speaking in this way of the citizen it is implied that the press is not well informed on this subject. The Standard Oil Company is certainly an interesting and sensational thing, and a fitting subject for press comment; but it has so many sides that it is difficult to give more than a fragment at any one time, and the most general or central facts pertaining to it newspaper men will no doubt universally agree are exceedingly difficult of penetration.

If there was ever anything in this country that was bolted and barred, hedged round, covered over, shielded before and behind, in itself and in all its approaches, with secrecy, that thing is the Standard Oil Company. The energies of Congress, of State legislatures, of criminal and civil courts, of special and general investigating committees, of corporate, journalistic, and private enterprise, have been expended in investigating this subject. As a result, there are tomes of literature that are rather appalling to look upon, and to investigate the investigations becomes a work of considerable arduousness. In the mass of literature produced, however, is illustrative evidence that can be succinctly set forth, and from which important conclusions very naturally follow.

There is a lateral but important branch of this subject which may as well be briefly referred to here, but which would well admit of an extended amplification and development. There is a growing sentiment in this country unfavorable to the accumulation of enormous fortunes in single hands, and, as the reverse of this, there is a disposition on the part of those who are possessed of enormous fortunes, or who are in the way to acquire them, to strengthen themselves against the feeling hostile to them. This cannot be done in any other way so effectively as by multiplying the holders of the enormous fortunes, and enlisting the zeal of their followers. By their power in the press, in the National and in state legislatures, in the courts, in official life, in political parties, in social ramifications, in literature, in the pulpit, we see developed a body of opinion which comes to be a part of the national life, and the sentiment which aims to dislodge it is reprobated as communism or revolution, to be suppressed summarily.

The source of this spirit is not in the walks of commerce as they have been known—mercantile, banking, shipping, manufacturing—but in that relation which a class bears to the public, wherein the public have no alternative but to accept the offices of this class in such spirit and such manner as it chooses to render them, unchecked by the competition which governs ordinary commercial relations, and so amenable only to a public sentiment which has not found out how to assert itself effectively. Railroad transportation and telegraphic transportation, in connection with the enormous landed interests which go with the former, are the chief sources of fortunes that are a menace to liberty.

The Standard Oil Company has taken a very high rank among the powers built on transportation to which I refer. Its name does not imply that its power is built on transportation, and that it is a transportation power; the name suggests commerce purely, and as commerce implies competition, the idea is not readily seized that its power is, first, of transportation and non-competitive; and, second, of commerce—the latter subsidiary to the former.

The Standard Oil Company preceded the east and west trunk lines in eliminating competition from transportation, and while these were still warring in their general business, the former had brought competition in oil freights practically to an end. What is more, the Standard became practically a dictator to the railroads of their relations to petroleum—not in terms, indeed, and in an arbitrary way, but in a general and conciliating one.

The Standard has occupied the felicitous position of being a transportation power that dealt and speculated in the commodity it transported, and a commercial body that, with fullness of knowledge, was guardian and dictator (qualified as in the preceding paragraph) of the transportation of its commodity. Those who were placed at disadvantage by this double relation of the Standard to petroleum, were refiners attempting to do a purely commercial business in connection with it, hiring their transportation as commercial firms ordinarily do; speculators in crude oil in the oil region, who would have desired greatly to know the relation the article they were interested in bore to transportation to the world's markets; and merchants or speculators, or both, in refined oil, who had a relation to it after it left the hands of the transporter and refiner for distribution in different parts of the world.

This full and exclusive knowledge has perhaps had as much, if not more, to do than advantages in transportation rates, in assisting the Standard people to absorb the business, as it enabled them to act with great confidence and boldness in the regular channels of the trade, while others could only act timidly and falteringly. Some people love to dwell on the foresight, energy, enterprise, and ability shown by the Standard in what it has accomplished, and point to the company as a monument of all these qualities. Let any set of business men not above the average in business characteristics obtain more favorable rates of transportation of an entire commodity than anybody else; let others be constantly misled about what the favored ones are paying, and let it be a speculative commodity subject to wide fluctuations, with transportation at times a factor as important, or more important, than the first cost of the article and its preparation for consumers; could they not drive others out of the business, and occupy it in all its branches, or nearly all, however extensive these branches might be? A belief has prevailed very widely through the petroleum trade for some years that half of the Standard profits have been derived from fluctuations; that is, were of the nature of speculative profits, and were not an ordinary mercantile profit at all.

The Standard's advantages in fluctuations are extraordinary. Its position gives it an intimate knowledge of the trade. It can buy crude, and sell it out both as crude and refined; it can sell crude "short;" it is able to withhold and has withheld supplies from foreign markets, while things were ripening for an advance, and it has sold largely ahead previous to a fall, and has practiced the tactics of the "short" sales on the refined oil market. Aside from the natural fluctuations, which it is in the best position to observe, there is its own power of manipulation, which a mere contemplation of position reveals.

Another source of extraordinary profit has been used by it. Railroad proprietors have done business at a loss, the Standard standing by and getting a benefit from the loss; and in the powers which the Standard has shown of

inducing the railroads to do business at a loss they have certainly been better circumstanced at times than if it had had resting upon itself a pecuniary responsibility in moving oil by rail from the oil region to the eastern sea-board.

The following propositions, showing the relations of the Standard to transportation, are established by official records. They are mostly drawn from the printed proceedings of the Hepburn Legislative Investigating Committee of the State of New York, 1879 and 1880. From exhibits, pages 418, 573, 180, 175, 470, 473, 621, 512, 514; from testimony, pages 3398, 3689, 3705, 3472, 3475, 3664, 3666, 6669.

A. That it has been its aim to make the business non-competitive through control of transportation.

B. That railroad managers have co-operated with it in this aim.

C. That success has attended it in this—not in every respect and at all times, but enough to throw the business into its hands.

The following minor propositions are closely related with the foregoing, and are equally educed from the official records:

a. That its relation to railroad transportation out of the oil country has enabled it to drive competitors out of business as shippers and refiners of petroleum.

b. That the railroad managers have shown no consciousness of committing an act adversely affecting public interests.

In proof of these propositions we have the following documentary evidence:

First. Four contracts of January 18, 1872, between the New York Central and Hudson River Railroad Company, the Erie Railway Company, and the Pennsylvania Railroad Company, and the Atlantic and Great Western Railway Company, and the South Improvement Company. In these four contracts the following passages appear:

"5. To charge to all other parties for the transportation of petroleum and its products, rates which shall not be less than the gross rates above specified; and should at any time any less rate be charged directly or indirectly, either by way of rebate, commission, allowances, or upon any pretext whatsoever, the same reduction shall be made per barrel to the party hereto of the first part, from the net rates provided for them, on all transportation for them during the period for which reduction shall be made to others."

* * * * * * * * *

"Article Fourth. And it is hereby further covenanted and agreed by and between the parties hereto, that the party hereto of the second part shall at all times co-operate, as far as it legally may, with the party hereto of the first part, to maintain business of the party hereto of the first part against loss or injury by competition, to the end that the party hereto of the first part may keep up a remunerative, and so a full and regular business, and to that end shall lower or raise the gross rates of transportation over its railroads and connections, so far as it legally may, for such times and to such extent as may be necessary to overcome such competition. The rebates and drawbacks of the party of the first part to be varied *pari passu* with the gross rates."

The South Improvement Company was an organization designed to accomplish, and by about the same parties, what the Standard combination subsequently accomplished.

Second. Contract of March 1, 1875, with the Erie Railway Company, and of January 1, 1876, with the New York Central and Hudson River Railroad Company, determining the relation of the Standard Oil Company with the terminal facilities of these railroad companies at the port of New York.

The former notes that the Weehawken oil yards (belonging to the Erie Company) are in full and complete possession of the Standard Oil Company, which possession is further given and confirmed by this contract. The Standard Oil Company is to do the business of the Erie Railway Company at these yards in the name of the latter company, and assume the charge and collection of freight and charges on all oil transported to the port of New York over the Erie Railway, and is to be paid five cents per barrel by the Erie Company for doing this business, the latter company not to be subject to risk on the oil after arrival and delivery at the yards. These points, with the exception of the leasing of the docks, also appear in the contract of April 17, 1874.

The contract with the N. Y. C. & H. R. R. Company places the terminal facilities of that company in complete possession of the Standard, which is consequently to handle all the oil received, taking the responsibility of loss by fire after it is delivered into its possession. Nothing is said in the contract, however, about the Standard collecting charges and freights in the name of the railroad company, as in the case of the Erie Company. The Standard is to provide means of taking care of oil as received, and delivering it to consignees. In consideration of these services to the railroad company, the Standard is to receive 10 per centum of the rate fixed from time to time for the transportation of crude petroleum and the refined products, on every barrel transported for the Standard, and for those authoritatively represented by it.

Third. Agreements of April 17, 1874, with the Erie Railway Company, and the A. & G. W. Railway Company, and of August 1, 1875, with the N. Y. C. & H. R. R. Company, and the L. S. & M. S. Railway Company, give conditions pertaining to transportation, but state that the rates should be adjusted and fixed from time to time, by agreement, between officers of the Standard and of the railroads; that the latter shall charge the former at no time prices higher than the lowest net rates paid by any other shippers to other railroads. In the case of the N. Y. C. & H. R., and L. S. & M. S. companies, if the Standard pays more than to a competing road, or another shipper pays to these roads or to a competing road, the Standard shall be refunded the excess with interest; and if the Standard pays a competing road more, the excess shall be paid to these roads with interest. The Standard itself, through an associated firm, was furnishing transportation tanks on cars of its own, and on railroad cars, and receiving from the railroads for so doing so much per mile in the former case, and so much per trip in the latter case, and taking the risk of fire and loss of oil, except from the wrecking of cars. The Erie Company, in this contract, agreed to make the surrender of the Weehawken docks, covered by contract of March 1, 1875, referred to on a preceding page, first putting buildings, erections, and appurtenances in good repair.

About this time an arrangement was entered into by the trunk lines from the oil regions to the sea-board for a division of the tonnage of oil, the division to be made by the Standard, this arrangement being independent of prices that might be ruling for transportation. We find an exchange of letters, dated Philadelphia, October 17, 1877, between the Vice-President of the Standard and the President of the Pennsylvania Railroad Company. The former writes:

"That you shall allow to, and pay us weekly, such commission on our own shipments and the shipments which we may control, as may be agreed to by your company and the other trunk lines from time to time; this commission, it is understood, has for the present been fixed at 10 per cent. upon the rate, and shall not be fixed at a less percentage, except by mutual agreement of your company and ours—provided that no other shipper of oil by your line shall pay less than the rate fixed for us before such commission is deducted; and no commission shall be allowed any other shipper unless he shall guarantee and furnish you such quantity of oil for shipment as will, after deduction of commission allowed him, realize to you the same amount of profit you realize from our trade."

President Scott replies that what is proposed "is satisfactory, the provisions of which shall be duly carried out."

Fourth. I am only able to adduce one specific agreement as to transportation rate paid by the Standard to the railroads. Taking effect June 1, 1879, the rate on crude oil from the Bradford field to New York was 20 cents per barrel, with corresponding rates from other fields, and on refined oil. On August 1st the Bradford crude rate was reduced to 15 cents per barrel. The nominal rate, from the Bradford field to New York, as given to the public, was reduced, in May of that year, from $1.15 to 85 cents per barrel. The public had no further intimation of a drop in the rate until it was announced, June 23d, that the rate was reduced from 85 cents to 30 cents per barrel. The reduction was made known to the Standard, which, before the public knew there was a drop, was selling refined oil enormously to foreign markets for future delivery. The ostensible reason for the reduction of the rate to 20 cents and 15 cents was to oppose the new outlet from the Bradford field to the sea-board, by the Tide-Water Pipe Company and the Reading Railroad Company. The offence consisted in an injury to the new outlet, and this Mr. F. B. Gowen, President of the Reading Railroad Company, pronounced before the Congressional Committee on Commerce, at Washington, January 27, 1880, to be "a criminal conspiracy of the most dangerour character;" in a injury to the stockholders of the railroads, as the rates were not advanced until April 1, 1880, about 17,000,000 barrels being moved to the sea-board at the reduced rate, which was estimated by Mr. Gowen to be one-half or one-third of the cost; and to foreign purchasers of the refined oil, who, while enormous contracts were being made, had no knowledge that the transportation rate had been reduced. The reduction continued so long that the Standard was not only able to fill its contracts, but was able to accumulate large stocks at the sea-board to fill contracts after the rate had advanced.

Fifth. The American Transfer Company was a Standard organization, which at one time was a pipe company in the oil country, not differing in general character from other pipe lines. When they were all absorbed by the Standard it was supposed to have been merged with the others into the United Pipe Lines, and to have become part of that system; and from the oil country standpoint it lost its identity, and made no report to the State Government at Harrisburgh, as pipe lines were required by law to do. It seems, however, that it retained title, or attained it subsequently, to pipes

connecting the united system with railroads; at Oil City, a few hundredfeet of pipe across the Allegheny river; at Olean, less than a mile; at Salamanca, at Kane, at Pittsburgh, a number of miles—at the latter place some 40 miles, substantially parallel to a railroad, so saving railroad transportation to that point, which was an important refining point, particularly for the Western trade. The oil producer supposed that the pipage charge of 20 cents per barrel paid for transporting from his wells to the railroads the oil he produced and sold; and it did, so far as there was any recognized fee of the American Transfer Company. On Feb. 15, 1878, however, the general manager of the American Transfer Company writes to the Vice-President of the Pennsylvania Railroad Company:

"I here repeat what I once stated to you, and which I asked you to receive and treat as strictly confidential, that we have been for many months receiving from the New York Central and Erie Railroads certain sums of money, in no instance less then 20 cents per barrel on every barrel of crude oil carried by each of those roads. Co-operating, as we are doing, with the Standard Oil Company and the trunk lines in every effort to secure for the railroads paying rates of freight on the oil they carry, I am constrained to say to you that, in justice to the interest I represent, we should receive from your company at least 20 cents per barrel on each barrel of crude oil you transport. * * * * I make this proposition with the full expectation that it will be acceptable to your company; but with the understanding, on my part, that in so doing I am not asking as much of the Pensylvania road and its connections as I have been and am receiving of the other trunk lines."

The reply is as follows:

"Your favor of February 15th has been received, and directions have been given to allow you, from and after February 1, 1878, the commission therein asked for, until further notice."

The South Improvement contracts were published shortly after the time they became operative, and in consequence of the popular uprising of the oil country were at once annulled by the Pennsylvania Legislature, through its control of the charter of that company. Nothing was known of the contracts with the New York railroads of April 17, 1874, of March 1, 1875, of August 1, 1875, and of January 1, 1876, until the year 1879, when the Hepburn investigation brought them to light. The Pennsylvania Railroad Company's letter of Oct. 17, 1877, and the American Transfer Company's letter of Feb. 15, 1878, were brought out by an investigation in Pennsylvania in the early part of 1879.

The contracts of the South Improvement Company show already no apprentice hand in the business of establishing drawbacks, and this business is believed to have been first projected on a large scale at Cleveland about the year 1870, when the managing director of the Lake Shore and Michigan Southern Railroad Company put capital into the business of refining under the management of the men who have since made the Standard Oil Company. From that time onward the steps to success were apparently taken with ease. The failure of the South Improvement Company only developed the fact that secrecy was a factor of the utmost importance. Enterprises in the oil business pertaining to the piping, shipment, and refining of oil, with the noteworthy exception of the Tide-Water Pipe Company, started in 1879, and which still lives, were entered into as other enterprises are entered into, but were mostly abandoned in bankruptcy and despair, when not swallowed up by the power that had obtained an administrative relation to shipments from points of production to the markets of the world.

In seeing this point we see the essential point of the Standard Oil Company. Its success has been a personal success with railroad men who have proved facile to its desires, and on this its claims to genius and unwonted enterprise must rest; after this, with ordinary sagacity, comes merely an accumulation of clerical and mechanical work. The public mind of the oil country and of the oil trade has rebelled; but, with railroad facilities representing railroad capital against it, it has been like an imprisoned bird beating its wings against the iron bars that confine it. Private enterprises have been started, and anything like the achievement of a successful position has been the signal for an onslaught for the ruin or the possession of the property. The ground the Standard has taken for itself must not be trenched upon. Adverse opinions have been fought by securing possession of the public press of the oil country, and the man of power in opposition has been a man to be conciliated by a share of that of which there was so much. $40,315,609 of exports for the fiscal year 1881, and $61,789,438 for the great bull year ending June 30, 1877, to which is to be added one-quarter to one-third more for the domestic consumption of the United States, show sums from which a revenue was to be drawn. Its plant is now newspapers, pipe lines, storage tanks, oil country and Western refineries, capitalized at over $100,000,000. Does this illustrate development in free America from a small beginning at Cleveland twelve years ago? The company is putting its hands on other industries, and a wider public may yet have a more intimate knowledge of it than is set forth in this article.

The "Victor" Gas Engine.

The experience of those who have tried the gas engine as a motor power has been so favorable as to give great stimulus to invention in this direction.

The Victor Gas Engine Company, of Liverpool, are at present engaged in introducing upon the market a new gas motor, called the "Victor." The London *Journal of Gas Lighting* says that both horizontal and vertical types of engines are being manufactured; the former being on the high-pressure principle, for powers ranging from 1 horse to any required size. The novel features of the horizontal engine are that the main piston travels the full length of the cylinder, instead of leaving a space between it and the cover, over which the piston does not pass; and further, the main piston contains a secondary piston actuated by a pneumatic arrangement derived from the pressure of the explosions, so that it is normally in such a position that it forms a flush end to the main piston—in other words, the secondary piston is so constructed that it travels to and fro inside the main piston; being actuated by air pressure primarily operated by the explosions themselves. To make the matter more fully understood, it may be briefly stated that the cycle of operations is as follows: On the engine making an outstroke, to take in a charge of air and gas (the secondary piston being in position as left after the previous exhaust stroke), a charge of explosive mixture is drawn in. On the return stroke the piston compresses the gas and air; the secondary piston being forced into the bore of the main piston, thereby forming a cavity to act as a combustion chamber. As already stated, the main piston travels the entire length of the cylinder; and, on the completion of the compression stroke, the charge is fired and the pistons are propelled outward. At the same time the pressure of the explosion passes through the valve in the secondary piston, thus admitting a pressure of from 30 to 40 lbs. behind it. This pressure being thus imprisoned between the secondary piston and a diaphragm in the main piston, on the completion of the power stroke and the opening of the exhaust valve, at once propels the inner piston up to its original position, so that the main piston as it returns on the exhaust stroke entirely expels the products of combustion from the cylinder. The inventors state that this entirely prevents the possibility of back explosions.

The peculiar form of the piston necessitates also a different arrangement of the charge of air and gas; as, in consequence of the want of an incombustible diluent, the explosions would possibly cause a slight shock. The charge is, by the combined action of the gas valve and the slide (the former being actuated by a kind of parallel motion of an ingenious kind, and worked off the slide valve), so constituted that, as the piston commences its outstroke, gas alone is drawn in for a fraction of the stroke; then a mixture of air and gas—the gas being reduced until at midstroke a mere trace is present, and for the remaining half of the stroke the gas is naturally increased again, thus forming a charge more strongly impregnated with gas at the ends, with an exceedingly dilute mixture in the center. This arrangement of the charge is found to give unusually good results, without shock; the first undrawn part of the charge forming an elestic medium against which the sudden expansion or explosion of the latter half is taken, whilst as the mixture burns through (as it were) the zone of greatest dilution, the separate explosion due to its combustion is in turn rendered free from any shock by the products of the first explosion. Thus there are practically two distinct explosions following one another during the one outstroke; and diagrams taken from these engines show a second elevation of the line of pressure, due to the expansion of the second half of the charge.

Another feature of novelty is the arrangement for firing the charge. Advantage is taken of the constitution of the charge, as already described, to utilize the system still further. From a master light outside the valve box a small traveling flame is carried toward the cylinder port; but long before it reaches the main port the compressed mixture is admitted with the gas to the traveling light, which is gradually cut off, thereby transferring the flame from the gas supply to a portion of the compressed mixture drawn from the richest part of the charge. The flame burning with increased intensity as the compression proceeds, finally meets the charge, as the port opens, with a body of green flame of such intensity that certain ignition is insured; missing fire with the valve in proper order being practically impossible. There are thus no ports, passages, or holes to be drilled or cut on the cylinder face; the whole operation of lighting being performed in the valve itself in a very simple way.

The engine possesses many other novel but minor points of interest; it has very few parts, and appears easy to manage. The same makers have an engine specially adapted for purposes requiring a steady uniform pressure. It is similar to the one already described, but is made to take the explosion at every revolution. The manufacturers state that the consumption of gas and oil in these engines is very small, tests showing the use of only 17 feet per indicated horse power per hour, including the outside light.

The small power (vertical) engines on the non compression principle need no detailed explanation in these columns.

A Difference of Opinion as to the Cost of Electric Lighting between Mr. Lane Fox and "Engineering."

We published in our last number a criticism, by *Engineering*, upon certain glowing predictions of Mr. Lane Fox, made in his lecture delivered before the Royal United Service Institute. Mr. Fox thinks that *Engineering* hardly does him justice, and sends the following letter to that publication, in which he attempts to justify the statements made by him at the Institute. We also republish what *Engineering* says in answer to Mr. Fox's latest communication—

To the Editor of *Engineering*—Sir: In the "Electric Lighting Notes" of your last issue, you say, in criticising my lecture at the Royal United Service Institution, "In the first place, taking his own data we work out the cost for him, with coal at 20s. per ton, to be rather more than a halfpenny instead of a farthing." In the same way you might have worked it out, "taking my own data" with coal at 40s. per ton, and then you would have found the cost to be a little over a penny; and further with coal at 4s. per ton (the actual price of good coal delivered by rail in Glasgow) you would have found, always taking my own data, that the cost was a little under half a farthing. But taking the price of coal at the average rate throughout the kingdom, as I have taken it, you will find that my estimate of a farthing is not so far out.

Next you say that "An ordinary gas jet costs one-fifth of a penny per hour." I have put it at a farthing. Well, let that pass. You go on to say that "to-day there would be a difficulty in getting a supply of incandescence light at the price of gas." You might, indeed, have gone further, and stated with perfect truth that there would be a difficulty, and a very great difficulty, in getting a supply at all.

Finally, you say, "We wish that Mr. Lane Fox had been more explicit with his audience, and had furnished reasons which would have enabled us to share his rosy anticipations." If you had read my lecture before criticising it, you would have found that your wish might have been gratified, for, indeed, the chief object of my lecture was to indicate "the possible direction in which this great reduction is to be made." My reason for thinking that we have not arrived at a final stage in electric lighting, for that is what it comes to, is simply that we have not yet had any opportunity of testing electric lighting on a large scale with a properly organized system of electrical distribution. When such systems are established on a scale similar to those of gas, as I hope and believe they will be before long, I have no doubt that you, in common with the rest of the world, will be able to share my "rosy anticipations."

I am, sir, your obedient servant,

ST. G. LANE FOX.

[In the lecture we ventured to criticise last week, we find that Mr. Lane Fox crystallizes his convictions on the subject of electric lighting by incandescence, in the following sentence: "An ordinary gas jet is equal to twelve candles only, so that for the same price twelve times as much *light* can be produced by electricity as by gas." We need not repeat the substance of our criticism, to which Mr. Fox takes so much exception, but we will supplement it by a few deductions made from careful estimates prepared by responsible engineers. Mr. Lane Fox has obtained all his results by placing his figures too favorably for electricity and too unfavorably for gas. Thus he assumes a consumption of 1¾ pounds of coal per horse power per hour, and allows for no losses of fuel. He assumes that the cost of this coal represents one-third of the total outlay for the production and distribution of electrical energy, including a business profit on the undertaking. He says that a gas jet burning five feet per hour costs one farthing an hour, which is not the case; it costs less than one-fifth of a penny; and that such a jet is equal to twelve candles only. Dr. Siemens states that it takes "five cubic feet of gas to produce the same luminous effect as one incandescence light of sixteen candle power," and this is very close to actual fact; therefore, assuming for a moment a profitable production and distribution of electric energy at one farthing per horse power per hour, converted into 150 candles, we should require 8.12 gas jets to obtain the same result, and costing 1.62 pence per hour, or 6.5 times the cost of electricity; instead of 12 times as Mr. Fox has it. But this estimate of one farthing per hour per horse-power, cannot be accepted as correct. This price has to include the cost of establishment, production, maintenance, capital, and profit. Also the renewal of lamps, since Mr. Fox includes the production of light as well as the distribution of the energy creating it. Of course he assumes the case of works on a very large scale to produce his 600 candles for a penny an hour. In his very admirable address delivered recently before the Society of Arts, Dr. C. W. Siemens gave very detailed estimates for an installation on a very large scale, a factory of 7,042 horse power; in this estimate we notice that he takes the price of coal at 20s. a ton; a figure to which Mr. Fox takes so much exception. Now, Dr. Siemens' estimate of annual expenditure for the supply of 64,000 lamps may be summarized as follows, the total cost of establishment having first been shown to be £177,000. The length of time assumed for burning each lamp was six hours a day, representing eight hours' consumption of coal at 2 lbs. per horse power per hour.

Cost of coal at 20s. per ton	£18,300
Wages, repairs, etc.	6,000
Depreciation at 7½ per cent.	13,300
Management	3 400
Total	£41,000

This is equivalent to 12s. 9½d. per lamp and per year for the above items; to them has to be added the cost of lamp, renewals at 5s. per lamp each 1200 hours, or 9s. a year, making total cost per lamp 21s. 9½d. a year. This estimate, however, shows no profit, and Mr. Fox says that a profit is included in his farthing. Now, 10 per cent. is a very moderate profit to look for in commercial undertakings, and if we assume this, there will be £17,700 to add to the £41,000, or £58,700 a year, equivalent to 18s. 4d. per lamp, plus 9s. for renewals, or 27s. 4d. for each lamp. It is only fair to include this 10 per cent. profit in making a comparison with gas, the prices charged for which are sufficient to pay about ten per cent. According to Dr. Siemens, 5 feet of gas properly burned, produces as much luminous effect as a 16-candle incandescence lamp. Such a burner, in use during six hours a day, would burn 10,950 feet of gas, which, at 2s. 8d. per 1,000, amounts to 29s. a year, more evidently than the incandescent light, but very far from Mr. Fox's twelvefold. Now, we will take another case, and make use of some of the figures in Conrad W. Cooke's admirable report to the Sheffield Town Council. This report deals with the supply of about 10,000 lights for private purposes, delivered from a central station to, but not within the houses of consumers, so that the cost of domestic fittings, lamps, etc., is not included in the estimate. In this case coal is taken at 9s. per ton, with compound condensing engines and locomotive boilers, burning two pounds per horse power per hour. The expenses are summarized as follows by Mr. Cooke—

	Cost per Lamp per Hour. pence.	Cost per Lamp per annum of 3,000 hours. s. d.
Cost of production	.022	5 6
Maintenance	.028	7 0
Management	.004	1 0
Interest on capital, 5 per cent.	.020	5 0
	.074	18 6

Increasing the interest on the capital to 10 per cent., as in the previous case, the cost per lamp per hour reaches .094 pence, or 23s. 6d. a year, and allowing for 2½ renewals of lamps during the 3,000 hours of the year at, say, 4s. a lamp (Dr. Siemens estimate of 5s. being probably high), the total cost of each lamp would be 33s. 6d. per year to the consumer. Gas in Sheffield costs 2s. 4d. per 1000, the price being lower than in London, because coal is cheaper. A gas burner consuming 5 feet per hour during 3000 hours would burn 15,000 feet, which at 2s. 4d. equals 35s. Now these two estimates, carefully and quite independently prepared by two well-known authorities on electric lighting, for two localities where quite different conditions prevail, may reasonably be accepted as representing what can practically be attained, so far as present experience or reasonable expectation of development permits us to calculate. From the foregoing it will be seen that the various deductions stand as follows, the first two substantiated by careful and detailed figures, the third resting only on vague and general statements so far as appears from Mr. Fox's lecture.

	Cost of Incandescence lamp per Hour. d.	Cost of Gas to give Equivalent Luminous Duty. d.
Siemens	.149	.158
Cooke	.134	.140
Lane Fox	.0208	.250

—ED. *E.*]

Bitumenized Bricks.

The London *Builder* states that, in a recent issue, the *Deutsche Bauzeitung* called attention to an experiment in street paving in Berlin. Bricks of the dimensions of 8 by 4 by 4 inches (in the quality of the usual so-called white spandrel-bricks) have been employed which have been impregnated with asphalt by a patent vacuum process. By this mode of treatment, after the expulsion of air and water has taken place, the bricks absorb from 15 to 20 per cent. of the bitumen, and the porous easily destructible substance is changed into a tough elastic mass, said to be capable of resisting pressure and concussion in an exceptional degree, and resisting the ingress of moisture. The bricks are then laid upon a concrete foundation, six inches in thickness, by means of hot tar.

The traffic at the point in question has always been heavy, as no less than 1,000 light vehicles per hour are said to cross the spot chosen for the trial, in addition to 1,300 tram-car journeys over this portion of the roadway. No

previous system of paving has been found to last beyond three months without showing signs of injury, and the opinion is expressed that this new paving material has the needful resisting properties, as it is rougher than compressed asphalt and harder than wood. Besides these advantages the points of junction are said to afford a firmer foothold for the horses, and there is no absorption of moisture. The importance of this method is also dwelt upon with special reference to the construction of waterproof walls, stable pavements, counter walls, etc.

A more recent issue of the *Thonindustrie Zeitung* discusses the matter in a critical spirit, and records the fact that at the point named some of the bricks display, after about three months' wear, such crumbling that they have had to be replaced, which has, however, been done with comparative ease and rapidity. It is remarked that the rather sudden failure of these bricks is the more surprising as they had not previously exhibited signs of wearing away, and doubts are expressed whether the material chosen to be impregnated is really the most suitable for the purpose. An examination by Herr Rühne of specimens of the defective bricks seems to have raised in his mind some doubts as to the efficacy of the process as really increasing their resisting properties. Machine-made bricks had been used, which are, as a rule, wanting in homogeneousness, and although the surface was decidedly strengthened by the process, the middle of some of the bricks had apparently not been impregnated. He does not, however, attach any conclusive importance to these appearances, as some of the crumbled bricks were impregnated throughout. The reason of the sudden wearing away when once the outer surface has been affected is not easy to explain, as frost could not have penetrated the surface, and it is not supposed to have rendered the asphalt brittle. Hence it is argued that the want of complete success may be fairly attributed to the kind of brick chosen, and possibly in some degree to some peculiarity in the manner in which the process of impregnation has been carried out. The hope is expressed that further experience will remedy the partial imperfections which have been found to exist in the application of the principle indicated.

A correspondent of the same journal remarks that wall bricks can, by an old method be impregnated up to 23 per cent. of their original weight, with a mixture of asphalt and tar, and that he fails to see the advantages of the new process. He gives various interesting details in proof of his assertion that the strength of the impregnated brick is dependent upon its qualities before impregnation, and that the process in question cannot remedy such defects as have originally existed in the bricks.

According to the quoted reports of the Municipal authorities of Stuttgart, the system of laying down the bricks impregnated according to the older process, between the tramway lines, has proved decidedly successful. An extension of its application is recommended, on the grounds of the durability thus arrived at, as well as the more comfortable track which is obtained, and the contingent economy in the supply of horses for the requirements of the traffic."

The Davies Incandescent Gas Light.

A new incandescent light is among the novelties recently announced on the other side of the water. It is, rather unaccountably, not numbered among the exhibits in the gas department of the present exhibition at the Crystal Palace, although it is hoped that before the display terminates an opportunity will be afforded visitors there of seeing it in operation. It is the invention of a gentleman named Davies; and, while it does not appear that all the advantages claimed for the use of any of the incandescent gas lights, as at present constructed, have ever been completely realized in practice, great attention is being given to their improvement. The following somewhat unsatisfactory description of the "Davies" light is taken from the *Review of Gas and Water Engineering*—

"The activity that has been visibly apparent amongst gas engineers to improve the light obtainable from coal gas for some time past, fortunately shows no signs of diminution. Amongst the new features introduced for public approval are incandescent lights and it appears probable that this form of illumination will engage the attention of some inventors, in the hope that they will be enabled to produce a simple and reliable light, that gas companies will feel justified in assisting them to recommend to the great body of consumers. We are now told that incandescent lights are not new. With this assertion we are not about to cavil, but nevertheless it is certain that this form of burning gas has never received a public exposition here until the opening of the present exhibition at the Crystal Palace. Two incandescent lights are shown there that are causing much interest among the visitors, who are evidently not prepared to see gas introduced to their notice in such a manner. While willing to accept the inventor's assertions as to their economy and other advantages, for the present, we are bound to admit that a certain drawback exists to their general adoption from the fact that power is required to produce the light, which must for a time confine their use to those buildings where some motor is in use, or to others, the owners of which are ready to erect the apparatus made by the inventors of the light to supply the amount of air under pressure to install it. We have, however, recently had the opportunity accorded us of being present at a private view of a new incandescent light that is produced without the assistance of any motive power. We can only regret, in the interests of the gas industry and for the benefit of the inventor, that that the new application is not exhibited among the novelties in gas lighting at the Palace, where we have no hesitation in saying it would have created more surprise than in any other of those present. We do not despair yet of seeing it there, and we cannot help thinking that there are many connected with the gas lighting industry that, were they cognizant of it, would interest themselves in bringing it to the front.

"The inventor has been engaged during the last four years in perfecting his arrangements, and now introduces it as distinct from either of the other incandescent lights before us. At present all the details are a secret known only to the inventor, and we are only enabled to describe its general features and the outward appearance of the means by which it is produced. The light is of the carbureted type, but what the component parts are that constitute the liquid employed we are in ignorance. Although no motive power is employed, a vessel, similar in appearance to a tiny gasholder, must be fixed in the building where the light is to be used, unless erected on a large scale at a gas works, and carried to where required. As at present laid down pipes of only a very small diameter are required, and these are carried from the vessel in question, side by side with the gas supply, and end with taps of the ordinary character. It is not necessary for the vessel containing the liquid to be above the light; it may be placed in a basement, the automatic pressure being sufficient to carry it wherever it is required. The arrangements at the lighting end consist of a small metallic vessel, for a single light, very little larger than the governor of a street lamp, and one shown us, with three burners branching from it, about the size of a lawn-tennis ball, though not completely round. In this burner, to outward appearance differing but little from an ordinary fishtail, but specially constructed as regards its interior features, is fixed the two pipes containing coal gas and the liquid being discharged into it by means of the taps. Beyond the tip of the burner is placed the material that forms the incandescent light; this is composed of a substance which is asserted to be as indestructible as platinum and much less expensive. Turned on, and lighted, a small flame appears for a few moments which disappears, as in other lights of this class supplied with air under pressure, and the incandescent light remains intact. We then see a light sending out rays in all directions which closely resembles the electric light, in fact had we seen it without previous intimation of what it was, we should have supposed we were looking at an arc light. The single burner was said to be giving at least an 80-candle power illumination, and, to show its full power, was unveiled, but it is proposed that shades or globes shall be added for interior lighting. Questioned as to the products of combustion Mr. Davies asserted that he burnt nearly, if not quite, all of the deleterious compounds; and from the appearance of the ceiling (the light being scarcely a foot from it) we can scarcely suppose that any carbonic oxide was given off. A notable feature in connection with the light has yet to be mentioned. Mr. Davies asserts that, while anxious to work with coal gas, and so help to promote its consumption, in districts where gas is not in use, he can produce as good a light without its assistance as with it. As regards cost, we are informed that in connection with coal gas or otherwise, the cost of the light will prove considerably less, and for lighting large spaces where gas is now employed, the cost of the addition of the apparatus for producing the increased illuminating power of the Davies incandescent light should render the desire or the necessity for introducing electricity quite superfluous. It must be understood that we do not indorse all the assertions of the inventor, although we have no reason to doubt them. We can only speak of the light as we find it, and we again unhesitatingly assert that it introduces gas as an illuminating medium in a manner such as has never yet been brought to our notice."

Present Daily Petroleum Production.

From the most reliable figures obtainable, the present daily production in what may be termed the Pennsylvania district, may be placed at the following—

Bradford	36,720 bbls.
Allegheny	12,000 "
Cherry Grove	1,800 "
Forest and Warren	4,350 "
Lower country	8,630 "
Total	63,500 bbls.

The above table shows a decline in every section, as compared with the report in the December *Petroleum Age*, which was compiled up to the 20th of December, though this decline is very light in the Warren and Forest division. The report has been carefully compiled by disinterested statisticians and is 2,000 less daily than their report for last month, and is nearly 3,000 less than the report of the *Age* mentioned.

Items of Interest from Various Localities.

Gen. Sickles to the Fore.—At a meeting of the aldermanic committee on streets (N. Y. city), held to investigate the alleged nuisances and dangers caused by steam heating pipes under the streets, several witnesses testified to the evil results experienced in the district occupied by the American Steam Heating and Power Company. Gen. Daniel E. Sickles, as one of the directors of the steam heating company, admitted that there "had been one or two incidents that might have reached the magnitude of explosions, etc." He complained that the company represented by him "had to bear all the burden of blame, not only for its own faults, but for those of the gas and other companies. It was not justly accountable for the gas companies' pipes leaking, but was held by the public to be so." We should not wonder if the courts held that his company was liable for its slipshod method of placing its mains.

Perils of Overhead Electric Wires.—An electric light wire connected with the great sugar refining establishment of the Havemeyers, in Brooklyn, N. Y., came in contact with a fire telegraph wire a few nights ago. The effect was at once witnessed in all the instruments on that fire circuit, notably in the office of assistant chief engineer Smith, on Fourth street, and at the Fourteenth ward bell tower, which were more or less damaged. The man on duty in the bell tower received a terrible fright by the sudden appearance of what he described as a ball of fire, which shot out from the instrument, and a somewhat similar exhibition was witnessed in the assistant chief's office. Many of the alarm boxes on the circuit were also damaged. Telegraph Superintendent Wilkeyson severed the current in the battery room in the Eastern District, and promptly set to work to repair damages. Fortunately no one was hurt.

Poughkeepsie Gas Matters.—A new scrubber has been put into operation at the works of the Poughkeepsie Gas Company. The make at present amounts to 90,000 cubic feet each 24 hours. Coal is used in the manufacture, principally Youghiogheny, with about 10 per cent. of Cannelton cannel. A ready market is found for the tar and ammonia in New York city. Gas of 18-candle power is supplied.

The Electric Light did it.—There was quite a panic at the great retail drygoods establishment of Ridley & Co., at Allen and Grand streets, New York City, on the evening of Saturday, Feb. 10. It was occasioned by the slipping of a belt connected with the electric apparatus which supplies the current to the arc lights which are in use there. The shutting off of the current caused the extinction of the lights in the front part of the store, leaving the place in partial darkness. Some weakminded person raised the alarm of fire, and great consternation ensued amongst the thousand or more shoppers who were in the place. It was the work of but a few minutes to turn on the gas jets, and the employees, with the assistance of the police, succeeded in allaying the excitement. No one was injured.

Water Gas in Omaha.—It is said that steps are being taken looking to the introduction of water gas in Omaha, Neb. The *Herald* of that place seems to think that there may be some excuse for watering whiskey, because it is likely to make it (the whiskey) less harmful; but the same authority is not so certain of the beneficial effects which would accrue from watering gas. There are a great many people in other parts of the country who are of the same opinion regarding the latter proposition.

Street Lighting in Pittsburgh, Pa.—The Gas Committee of the City Council of Pittsburgh, Pa., have reported favorably on the proposition to add 55 street gas lamps to the number already in use in that city.

A Dishonest Clerk.—Martin W. Culp, one of the clerks attached to the Philadelphia Gas Trust, was found to be a defaulter. When he discovered that his accounts were to be overhauled by an expert, he decamped. Measures were at once instituted to cause his arrest, which was soon accomplished. The amount of his stealings will probably reach $1,200.

A Fat Office.—Representative Chittenden, of Allen county, Indiana, introduced a bill before the Assembly of that State, now in session, which, if passed as originally presented, would prove to be a bigger "bonanza" than any that was ever uncovered on the world-famed Comstock lode. The bill provided for the appointment of a State Inspector of Gas and Gas Meters, with the usual provisions contained in such "strikes." The scale of fees which it was proposed to charge would enable the lucky holder of the office to make, during a three years' incumbency, the modest sum of $200,100. When the attention of Representative Chittenden was called to this fact, with great good nature, he reduced the proposed schedule one-half. Representative Chittenden says that he is not at all tenacious of the amount of fees allowed under the bill, but he simply wants the consumers of gas to be protected. Under the bill, if a meter is found registering "fast," the company is required to refund to the consumer the "proper percentage" on the last three months' bills paid.

Underground Wires in Chicago.—After the 1st of May, in Chicago, no person or corporation will be permitted to maintain or use any telegraph pole, telegraph wire or electric conductor in any street or alley of that city. Every great fire adds new emphasis to the cry of "Put the wires under ground."

The Dangers of the "Arc Light."—The promoters of the electric light are in the habit of publishing an appendix to their pamphlets which treats of the dangers attending the use of gas. It is stated that, in 63 Eastern factories where the arc light is used, insurance statistics for the past 12 months show no less than 21 fires occurred directly caused by the arc lights—principally from dropping of hot particles of carbon, improper guarding of wires, and the access of water to the electric current. It goes without saying that the "pamphlets" maintain a discreet silence about these occurrences.

Philadelphia Gas Meter Critics.—They have a "funny man" attached to the Philadelphia *Daily Press*. His "latest and grandest" effort has been directed at the gas meter, and it would be a shame not to mention something about this great exploit of his. After expending a large portion of his energy at the start, and not husbanding his strength for the finish, he winds up with the following:

"It is believed by those who best know their habits that they will keep on registering, and continue to register as long as any machinery is left in their insides, or hands upon their dials. The only way to cure them of the habit will be to smash them with clubs or to melt them down for old and very base metal.

"But how shall the bills be made out? The gas meter has been the foundation of that important factor in finance and society, the gas bill. We must have gas bills, for even the most radical reformer would hardly ask to be made even with the Gas Trust by receiving his supplies of gas for nothing. The method is very simple. Let the gas clerks guess at half the amount and then multiply by two. The result will be quite as accurate as any heretofore attained under the clumsy and complicated system of lying meters and an army of inspectors to see that the meters did their lying according to rule.

"If the meters must stay, let them cover their faces with their hands in shame for their past wickedness. Then let them lift up their hands and swear by all that is combustible and all that gives illumination that they will repent of their evil tricks and endeavor to tell the truth for all time to come."

The meter manufacturers of Philadelphia could not be brought to enter into the spirit which filled the soul of the aforesaid "funny man;" and caused the following letter to be sent to the *Press*:

Sir:—Our attention has been called to an editorial in to-day's *Press* entitled "The Wicked Gas Meter." In the article referred to it is stated that "this engine of iniquity is hopelessly perverse. It defies the rules of physical forces and laughs at the sciences of addition and division. It tells lies for its living, having been set in motion by the father of lies himself," etc.

Now, Mr. Editor I would like to ask if you sincerely believe this assertion? I am compelled to anticipate your reply by saying I fear you do, for I am not willing to believe that you would have published the article unless you felt confident every word of it was true. Thus believing, and also feeling confident that as the editor of a paper that intends to be just and fair in all things you will gladly publish anything in favor of the truth-telling abilities of this so-called liar, I respectfully ask on the part of the gas meter manufacturers of this city—it being the center of that manufacturing interest in this country—that you will select one or more persons in whom you have the fullest confidence—the more prejudiced they may be the better it will please us—and have them call on us with instructions to thoroughly investigate the subject of the gas meter in any and all directions, after which they are to report the result to you.

We then ask that you will publish the same for the enlightenment of the gas-consuming community. We submit that it is but just to a large manufacturing interest located in this city that this be done—particularly after your articles of to-day. Light is needed upon this subject. We are ready to give it and to answer any and all questions bearing upon the gas meter. Please afford us the opportunity to do so and oblige yours respectfully,

Wm. W. Goodwin,
President.

Philadelphia, Jan. 31. 1883.

The "funny man" has not been heard from since.

A Novel Method of Reducing the Price of Gas.—Dom Pedro's people do not appear to be possessed of that mild and beneficent temper which

is, or was, such a happy characteristic of that placid monarch. The gas company of Rio de Janeiro issued an official notification that the price of gas would have to be increased. This gave great umbrage to the authorities, who at once met in conclave and decided that the price of gas was already high enough, and resolved not to use any more gas until such time as the price should be restored to its former figure. This was all well enough; but the inhabitants of the place did not believe in the efficacy of such a peaceable proceeding, and determined upon more summary measures. They banded themselves together, and attacked the works of the company, partly demolishing its plant, and then turned their attention to the destruction of the street lamps. This was followed by marching upon and into the premises of consumers of gas where meters were smashed and service pipes destroyed. The aforesaid authorities frightened at the result of the operations of the mob, called out the military and the "iconoclastic" citizens were dispersed. The "funny man" of the Philadelphia *Press*, before referred to, might find a possible opening for his peculiar abilities down in Brazil.

Reduction in Price of Gas.—The East Chester, Mt. Vernon, New York, gas light company announces that on and after March 1st, 1883, the price of gas will be reduced from $3 to $2.50 per thousand cubic feet. This reduction is made upon a send-out of about five millions cubic feet per annum.

Suffocated by Gas.—On the morning of February 5th a man named Henry Shaw, aged 25 years, while making a connection between the main pipe of the West Manayunk, Gas Company and Dowell's paper mill, Manayunk, Pa., was overcome by the escaping gas, and died in less than ten minutes. The supposition at first was that the man died from heart disease, as the trench in which he was working was quite shallow, and it seemed almost impossible that he could have been rendered insensible so quickly from the mere fact of having inhaled the escaping gas. The coroner's inquest, held next day, however, disclosed the cause of death to have been suffocation superinduced by inhaling illuminating gas. This death was caused by water gas.

Disasters to Gas Works Caused by Floods.—The unprecedented falls of snow and ice formation experienced throughout the country this winter, followed by heavy rains and unseasonable thaws, causing creeks and rivers to escape their usual boundaries, have occasioned large amounts of damage and loss. The gas interest has suffered very severely, and reports of trouble have reached us from various points. At Titusville, Pa., the gas works were inundated, and the town left in darkness; at Youngstown, Ohio, floating cakes of ice tore away the lamp posts in the streets; at Bellaire, Ohio, the gas works were seriously threatened by the rapidly rising waters; at Marietta, Ohio, the works were completely flooded out. On Sunday, February 11th, it was telegraphed on to New York that the Cincinnati works were submerged, and it was stated that there was only enough gas on hand to last through the night. At this point, at that time, the Ohio river had risen 62 feet over the normal, and that the water was extinguishing the street lights. On the morning of the 13th we received a despatch from General Hickenlooper announcing that his works were closed down at 8 o'clock on the morning of the 12th; the city was left in darkness, and there was a depth of seven feet of water on Front street. At Madison, Indiana, the gas works were flooded and the town was left in darkness; a similar state of affairs exists at Jeffersonville, Ind.

No Opposition in Washington.—The new charter bill applied for by certain parties who were desirous of sharing the lighting of the city of Washington, D. C., (rather "feelingly" alluded to in the last issue of the Journal) with the Washington Gas Light Company, has failed. The prayer for the granting of the petition was denied.

A Diabolical Plot at Glasgow.—While such an affair as that at Rio de Janeiro might find some palliation from the fact that a great many of the inhabitants of that country are little better than savages, when we find that such things are possible in such a country as Great Britain we are at a loss to conjecture what will come next. The following from the special correspondent of the London *Journal of Gas Lighting* gives the details of this latest and most diabolical outrage:

Glasgow, Sunday, Jan. 20.—Last night, at about a quarter past 10 o'clock, an extraordinary explosion took place at the Tradeston Gas Works of the Glasgow Corporation Gas Commissioners. More correctly speaking, the explosion occurred at the gasholder outside the works proper, and separated from them by the Lilybank road and by a double line of railway forming part of the Caledonian Company's system. The explosion was something like that from the firing of an 80-ton gun, and it was heard over an area extending for several miles round the southern suburbs of the city—certainly to a distance of four or five miles. It was followed immediately by a vast illumination of the sky, which, however, was but momentary. The holder is constructed on the telescopic principle, and is 100 feet in diameter and 60 feet high, in two lifts of 30 feet each, and having a capacity of 1½ million cubic feet. At the time of the explosion the lower lift was wholly within the tank, and the other lift probably about 20 or 23 feet up; the contained gas amounting to something like 400,000 cubic feet. As the holder had been working well, without any suspicion as to its "drawing air" or containing any explosive gaseous mixture, there is great reason to suppose that some "play" has been designed and carried out by one or more persons who were diabolically "possessed." Whatever flame was produced, in immediate response to the explosion, passed in a south-westerly direction, and the fire was communicated to the tarred wooden erections of an adjoining rope-work, and great destruction was done to several wooden and wood and brick dwelling-houses and outhouses close by. Probably a dozen persons occupying these houses were more or less injured; several of them being so much hurt as to require removal to the Royal Infirmary. From a careful inspection that has been made to-day by the Convener of the Gas Committee (Mr. J. L. K. Jamieson), the General Manager (Mr. W. Foulis), and other experts, it is concluded that there has been no explosion of gas and air within the holder, and that dynamite or some other powerfully explosive agent has been used, with malicious intent. Suspicion as to "intent" is well based, owing to other devastation that seems to have at the same time been planned for last night.

Chicago Gas Light Company.—At the election of Directors for the ensusuing year, the Chicago Gas Light Company added the name of Mr. Theobald Forstall; Mr. Forstall was also chosen as Vice-President. The outgoing board was unanimously re-elected. The meeting was held Feb. 6th.

Death of Samuel Willetts.—Mr. Samuel Willetts, a gentleman widely known in connection with the gas interests of New York and Brooklyn, died recently.

Lighting the East River Bridge.—The Trustees who are in charge of the building and equipment of the East River Bridge recently invited tenders from the representatives of the various electric lighting companies doing business in the vicinity of New York city. In response to the invitation seven companies put in estimates. The specifications called for the supplying of plant and all appurtenances necessary for the establishment and maintenance of seventy lights. The lowest bidders were the Houchhausen Company, who agreed to do the work for a sum amounting to about $16,000. The matter of awarding the contract was referred.

Gasoline Explosion.—At Norfolk, Va., on Feb. 8th, a gasoline machine, in the restaurant of A. J. Smith, on Market square, exploded, wrecking the place completely. R. Pinner was killed, and five others injured.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

Explosion at the Gas Works, Lansing, Mich.

Lansing, Michigan, Feb. 3d, 1883.

To the Editor American Gas Light Journal:

At about 4:30 p.m., on the 25th ult., an explosion occurred in the purifying room of the gas works at Lansing, Michigan, making almost a complete wreck of the building. The roof was blown some distance into the air, turned round, and completely shattered. The south gable wall was prostrated, falling upon a two-story brick cooper shop adjoining, crushing it to the ground. Three men were at work in the cooper shop, but luckily all were near the front door and escaped unhurt; although, looking at the wreck afterward, it did not seem possible that a man could have been in the building and escaped. The north gable wall fell into the retort house, where three men were at work, but none were caught beneath it. A worse scared crowd, however, one would not care to see.

Very little damage was done to the machinery of the works, beyond the breakage of connections, etc., occasioned by falling timbers and masonry, and a few holes punched in the purifiers, etc.; making of gas was commenced in a few hours, no stoppage of the supply being necessary. Had the supply of gas given out it would have been peculiarly annoying, as the State Legislature is in session at the Capitol.

The cause of the explosion was escaping gas in the purifying room, a stoppage having occurred, and the gas blew out through the seal of the boxes. How it ignited no one can explain, as there is no connection between the purifying room and retort house; no one was in the room at the time, and the doors were closed and locked. Half an hour previously the foreman had visited the room, and everything appeared to be all right. Taking everything into consideration, the company think they escaped most fortunately.

Very truly,

E. F. C.

THE AMERICAN
GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—G. WARREN DRESSER.
Manager—C. E. SANDERSON.

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FRIDAY, FEBRUARY 16, 1883.

A Proposition to Alter the Nomenclature of a Part of the States.

The *Oil Report* says that Pennsylvania, Ohio, and New Jersey are to be re-incorporated shortly under the name of the Standard States, with Vandergrift as President and Rockefeller as Secretary of the Interior. The object of the States will be to enable the Standard Oil Company to more completely screen themselves from the public gaze and impertinence of the committees of inquiry.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.
(with W. B. Scott & Co.,)
34 PINE STREET, NEW YORK CITY.
FEBRUARY 16, 1883.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid.	Asked
Gas Co.'s of N. Y. City.				
Central	$466,000	50	80	90
Harlem	1,800,000	50	96	99
" Bonds	170,000			103
Manhattan	4,000,000	50	245	250
Metropolitan	2,500,000	100	190	193
" Bonds	658,000	..	106	108
Mutual	3,500,000	100	112	115
" Bonds	1,500,000		100	102
Municipal	1,500,000	100	180	185
" Bonds	750,000		106	110
New York	4,000,000	100	122	125
Northern	125,000	50	—	95
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	112	115
Citizens	1,200,000	20	67	70
" S. F. Bonds	320,000	1000	105	107
Fulton Municipal	3,000,000	100	70	80
Peoples	1,000,000	10	48	—
" Bonds	290,000	.	104	107
" "	250,000	...	88	90
Metropolitan	1,000,000	100	78	85
Nassau	1,000,000	25	50	55
" Ctfs.	700,000	1000	90	93
Williamsburgh	1,000,000	50	60	65
" Bonds	1,000,000	...	100	101
Richmond Co., S. I.	300,000	50	70	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y	750,000	100	72	75
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			41	42
Bonds			105	106
East Boston, Mass	220,000	25	122	128
Hartford, Conn	700,000	25	120	128
Jersey City	750,000	20	155	160
Laclede St Louis Mo	1,200,000	100	117	—
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	144	—
Oakland, Cal			32	33
Peoples, Jersey City		...	75	80
" " Bds.			...	...
Rochester, N. Y		50	70	80
Washington, D. C	2,000,000	20	200	210
Wilmington, Del		50	174	...
Yonkers		50	30	32
St. Louis Missouri	600,000	50	250	254
San Francisco Gas Co., S. Fr'isco Cal.			55	57
Toledo, Ohio			95	97
Troy, Citizens	600,000	100	—	—

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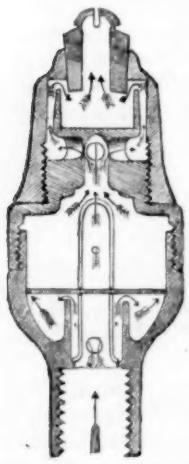

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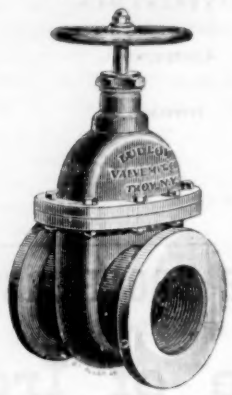

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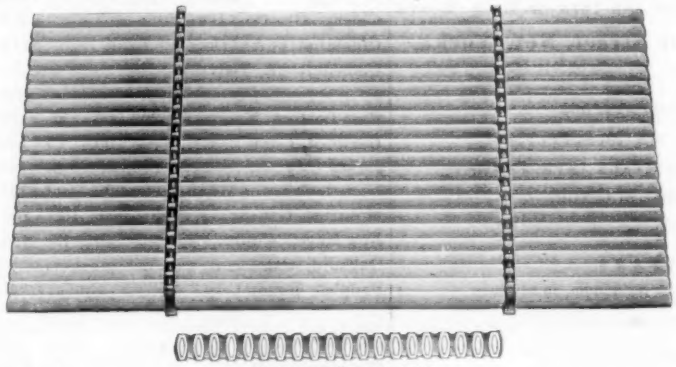

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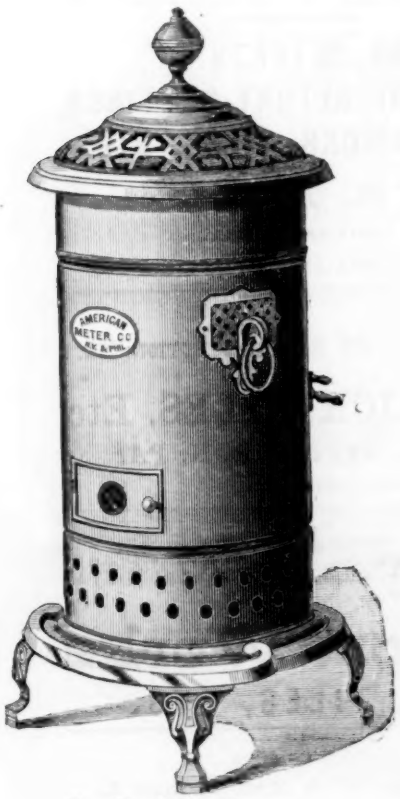

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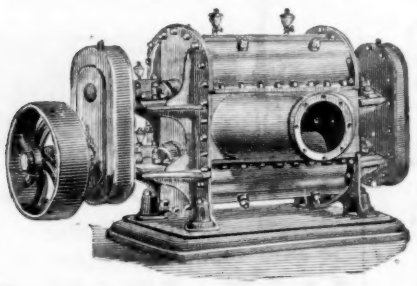

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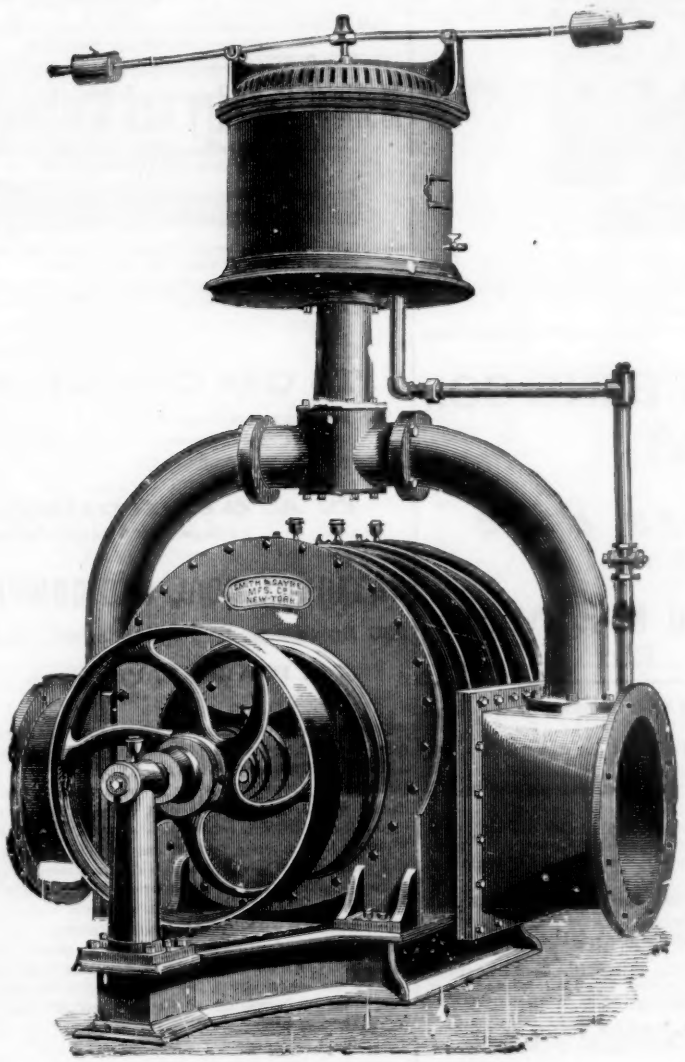

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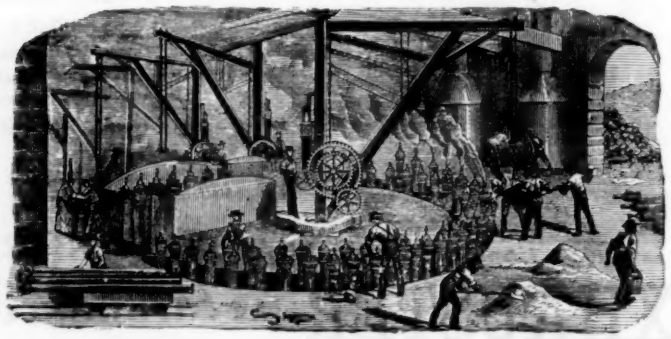

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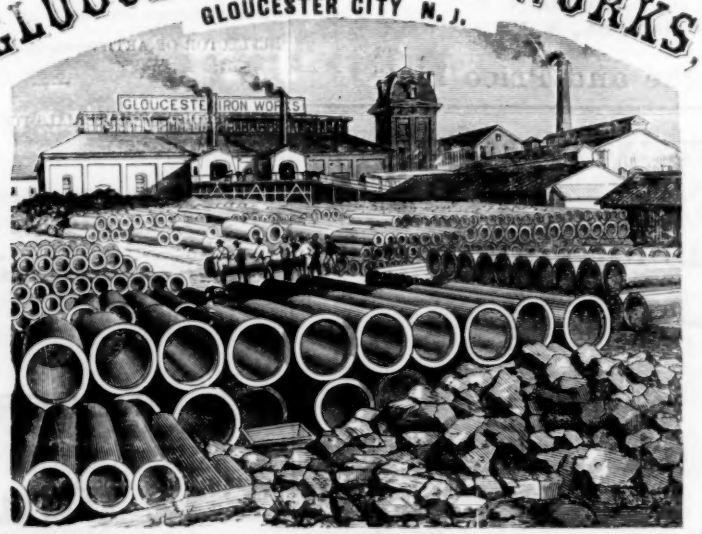

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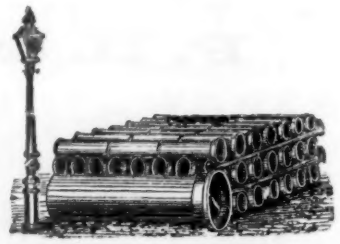

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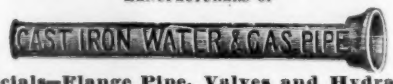

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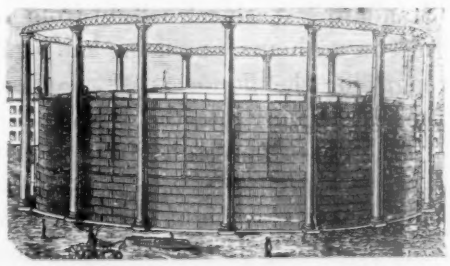

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SECTION III.—Ammonia. Sulphuretted hydrogen. Carbonic acid. The Cooper's Tube, or Eudiometer. To calculate weight of sulphur. Harcourt's color test. A rapid and accurate methodof estimating sulphur in coal gas. Specific gravity. To find the specific gravity of dry gas. To correct the bulk and find the weight of gas.

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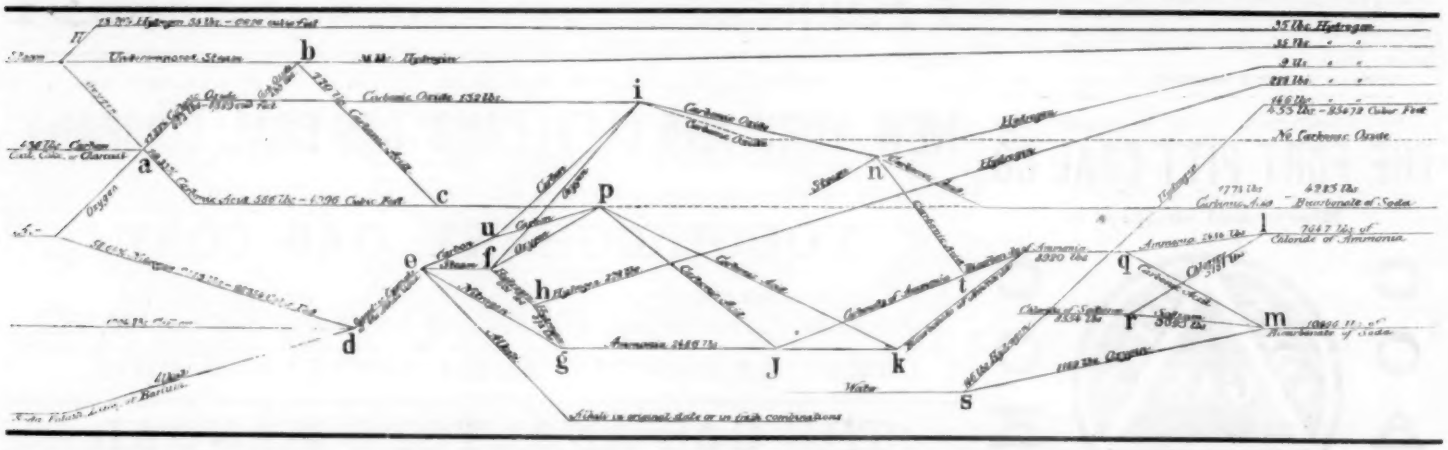

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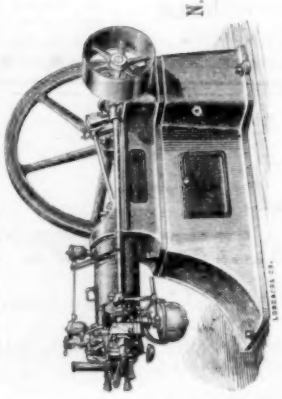

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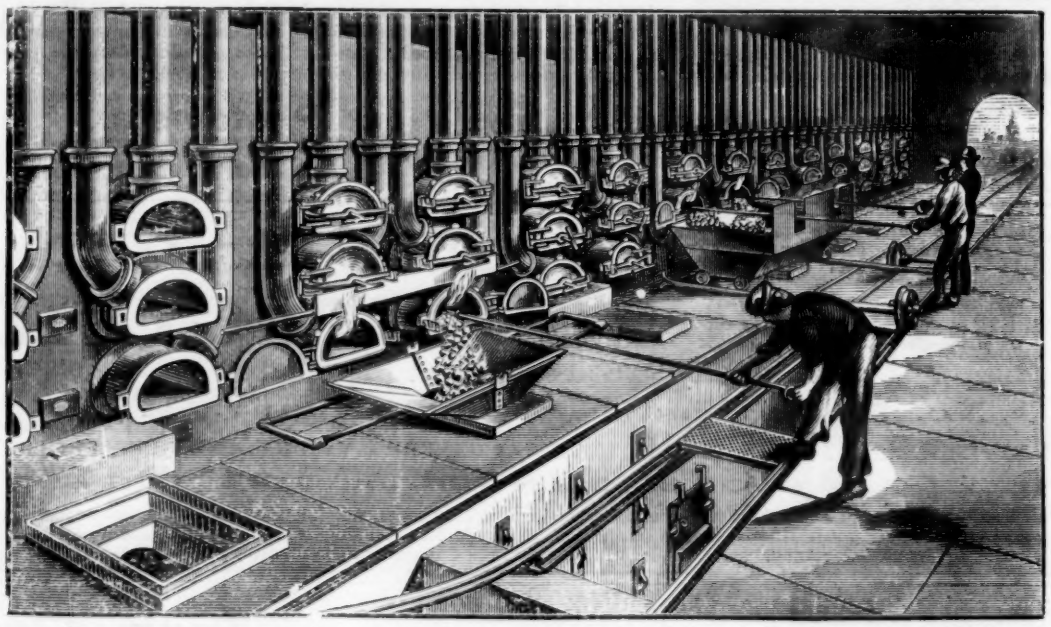

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